UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

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IN RE: NATIONAL PRESCRIPTION OPIATE LITIGATION — MDL No. 2804

Case No. 17-MD-2804

This document relates to:

The County of Summit, Ohio, et al v. Purdue Pharma L.P., et al
Case No. 1:18-OP-45090

The County of Cuyahoga v. Purdue Pharma L.P., et al
Case No. 17-OP-45004

Hon. Dan A. Polster

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HIGHLY CONFIDENTIAL - SUBJECT TO FURTHER CONFIDENTIALITY REVIEW

VIDEOTAPED DEPOSITION OF DAVID CUTLER, Ph.D.

Friday, April 26th, 2019
9:00 a.m.

Held At:
Robins Kaplan LLP
800 Boylston Street
Boston, Massachusetts

REPORTED BY:
Maureen O'Connor Pollard, RMR, CLR, CSR

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ALSO PRESENT VIA STREAM
E. McKay, Compass Lexecon

VIDEOGRAPHER: Robert Martignetti

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P R O C E E D I N G S

THE VIDEOGRAPHER: We are now on the record. My name is Robert Martignetti. I'm a videographer for Golkow Litigation Services.

Today's date is April 26th, 2019, and the time is 9:00 a.m.

This video deposition is being held in Boston, Massachusetts In re: National Prescription Opioid Litigation.

The deponent is David Cutler.

Will counsel in the room please identify themselves.

MR. KNAPP: Tim Knapp of Kirkland & Ellis on behalf of Allergan Finance.

MR. BAILEY: John Bailey, Kirkland & Ellis, on behalf of Allergan Finance.

MR. BRADLEY: Nick Bradley, Ropes & Gray, on behalf of Mallinckrodt LLC and SpecGx LLC.

MR. HALPERN: Richard Halpern, Marcus & Shapira, Pittsburgh, on behalf of HBC Service Company.

MR. HIMMEL: Brian Himmel, Reed Smith,

on behalf of AmerisourceBergen Drug Corporation.

MR. BREWER: Matt Brewer from Bartlit Beck on behalf of Walgreens.

MS. KOSKI: Katy Koski, Foley & Lardner, on behalf of Anda, Inc.

MR. MOYLAN: Dan Moylan, Zuckerman Spaeder, on behalf of CVS.

MS. CASTLES: Claire Castles on behalf of Walmart.

MR. GEISE: Steve Geise from Jones Day on behalf of Walmart.

MR. LONERGAN: Sam Lonergan on behalf of defendants Endo and Par.

MS. DOLEJSI: Holly Dolejsi from Robins Kaplan on behalf of Plaintiffs.

MR. BADALA: Salvatore Badala on behalf of plaintiff Cuyahoga County.

MR. LOESER: Derek Loeser from Keller Rohrback on behalf of plaintiffs.

MR. KO: David Ko, also of Keller Rohrback, on behalf of plaintiffs, also on behalf of the witness.

MR. SOBOL: Tom Sobol, Hagens, Berman, Sobol, Shapiro, for the MDL plaintiffs and the

witness.

MR. SACHSE: Will Sachse from Dechert LLP in Philadelphia on behalf of the Purdue defendants.

MR. HALLER: David Haller and Sean Taylor and Fatmata Kabia for McKesson.

MS. LEIBELL: Martha Leibell, Morgan Lewis, for defendants Teva and Actavis.

MR. KAISER: Matthew Kaiser, O'Melveny & Myers, for the J&J and Janssen defendants.

THE VIDEOGRAPHER: The court reporter is Maureen Pollard, and will now swear in the witness.

DAVID CUTLER, Ph.D.,

having been duly identified and sworn, was examined and testified as follows:

EXAMINATION

BY MR. KNAPP:

Q. Good morning, Professor Cutler. My name is Tim Knapp. I'm from Kirkland & Ellis. I represent Allergan Finance.

I'm going to be starting out in the deposition today. I expect that I'll have

questions for you throughout the day today. As we can see, there are a number of other defendants here, and they all have reserved their rights to ask questions, and I expect that that will happen at some point tomorrow.

Does that sound okay?

A. Yes, that sounds fine to me.

Q. Could you please state your name for the record?

A. My name is David Cutler.

Q. You understand that you're under oath in your testimony today?

A. Yes, I understand that I'm under oath.

Q. And is there anything that would prevent you from providing truthful testimony?

A. Forgive me while I put on the microphone as asked.

No, there is nothing that would prevent me from giving truthful testimony today.

Q. So throughout the day today I'm going to ask you a series of questions, and I'm going to assume that if you answer my question that you understood my question. Is that fair?

A. Yes, that is fair.

Q. If you don't understand one of my questions, I'd ask you to just ask me to correct it and I'll take a shot at correcting the question. Is that fair?
A. Yes, that's fair.
Q. Okay. When were you retained by the plaintiffs in this case?
A. I was retained in this case in June of 2018.
Q. Who were you retained by?
A. I was retained by the consortium of lawyers for the plaintiffs.
Q. Anyone in particular?
A. I believe the retention agreement is with the group as a whole.
Q. Okay. All right. In a second here I'm going to hand you a copy of your report. Did you write your report on your own?
A. I wrote all of the report. I had assistance in terms of writing, but it was all my writing.
Q. Who provided you with assistance?
A. There was a team of economic experts, and there was also a consulting firm.

Q. Who was on the team of economic experts?
A. Professor Gruber, Professor Rosenthal, and Professor McGuire.
Q. Did anyone on the team of economic experts write any portion of your report?
A. No, they did not.
Q. So what do you mean when you say they assisted you with your report?
A. We would talk through the issues involved, we would talk through the nature of the modeling, we talked through the data sources and the types of analysis, and the general findings.
Q. How often did you talk to Professor Gruber's -- Professors Gruber, Rosenthal, and McGuire?
A. We spoke regularly. I would estimate several times a week.
Q. Starting when?
A. Starting in June of last year.
Q. And have you maintained contact with them, talking to them a couple times a week up to the present?

MR. SOBOL: Objection.
A. Yes, I have maintained contact with those individuals, that's correct.
BY MR. KNAPP:
Q. And have you continued to speak a couple of times a week?
MR. SOBOL: Objection.
A. It varies by the week. Some weeks that amount, some weeks not as much, so it would not have been every week.
BY MR. KNAPP:
Q. Okay. And as we go on today we'll talk a little bit about your interaction with each of those individuals a little bit more in-depth.
MR. SOBOL: Maybe.
BY MR. KNAPP:
Q. Who are the consultants that you said assisted you in writing your report?
A. The consultants are from the firm Compass Lexecon.
Q. And who are they specifically?
A. The primary point person at Compass Lexecon is Hal Sider.

Q. Who is Mr. Sider?
A. Mr. Sider is an economist. He studies any number of healthcare topics -- excuse me, any number of economic topics, beyond just healthcare.
Q. How do you spell Sider?
A. S-I-D-E-R.
Q. And what was his role with respect to writing your report?
A. Mr. Sider was the principle involved at Compass Lexecon. The team at Compass Lexecon were the ones who did all of the data analysis, substantially all of the data analysis, and then provided inputs and suggestions, and on occasion I asked them to help me with different parts, and so they would do that.
Q. What parts did you ask them to assist you with?
A. Let me make sure I answer the question directly. They were involved with all of the parts with -- at various points with almost all of the report in terms of helping to make sure that what was said was accurate, that the analysis that was presented was appropriate,

that what was being said was what was done. So there was not a single section or two of the report, but rather help with all of the sections.

Q. You mentioned data analysis. What did Compass Lexecon do with respect to the data analysis in your report?

A. With respect to the data analysis, Compass Lexecon helped to gather the data, to input it into the appropriate statistical programs, to estimate the analyses under the directions that I provided, to do various testing that one does to make sure that the models are appropriate, and then to convey the results.

Q. And when you say "convey the results," they conveyed the results of the testing that they did to you?

A. That's correct, they would convey the results of the testing to me.

Q. And then you incorporated the results of the testing into the opinions in your report, right?

A. I took the results of the testing and

my own interpretation, and then I put those into the report.

Q. You mentioned testing of models that one does. What are you referring to there?

A. In order to judge how well a model fits, there are many criteria that one would use. Among those criteria include, for example, statistical output, for example, the R-squared of a regression, analysis of looking at individual data points or particular groups of data points, consideration of how results relate to other results in the literature, and other studies, consideration of the magnitude and whether the magnitude of the results are plausible, consideration of the overall structure of the model, and whether the model seems to be fitting well or whether there are outliers that are not being fit by the model well for which a different model would be needed.

So there -- so in the end there is a process that an economist, that an academic, that an analyst uses involving consideration of a large number of elements to determine whether

a particular model is an appropriate one or not.

Q. And you mentioned testing of the R-squared and certain data points. What particular types of tests are you referring to?

A. Can you rephrase the question, please?

Q. So you mentioned testing, consideration of different variables. And now I'm asking you what specific types of tests on the R-squared and other data points did Compass Lexecon do with respect to your model?

MR. SOBOL: Objection.

A. There's not a single statistical test. One of the things that they did, for example, was to output the R-squared, and that's something that I would look at that we would discuss as a group in terms of whether the model seemed to be fitting well enough, and that's something that would be -- that is commonly reported in articles, which is what is the R-squared of the model, and it's often remarked upon.

In addition, you asked about specific data points. It's very common in judging a model to see is it fitting well. For example,

if it's a cross-section, how well is it fitting the cross-section, or if it's a time series, how well is it fitting the time series by looking at predicted values or looking at other metrics. So it's -- as I said, it's a variety of inputs and not a single bright line that says this model is appropriate or this model is not appropriate.

BY MR. KNAPP:

Q. So you mentioned Hal Sider. Who else at Compass Lexecon was on the consulting team that assisted on your report?

A. There were a number of individuals at Compass Lexecon. The two others in addition to Hal with whom I worked most closely were Erica Benton and Evan McKay.

Q. Anyone else that you can recall specifically?

A. Those were the two who I spoke with the most.

Q. My question was, is there anyone else that you can recall specifically?

A. No, there's no one else specifically that I recall.

Q. And do you know how much time Compass Lexecon has billed to working on the models in your report to date?

A. I do not know how much time Compass Lexecon has billed working on the models in this report.

Q. Do you have an estimate?

A. No, I do not have an estimate of how much time Compass Lexecon has billed in this report.

Q. Do you know if it's over ten hours?

A. I don't have an estimate of how many hours Compass Lexecon spent on this report.

Q. You don't know if it was over ten, over 500, over a thousand, you just don't even have a ballpark estimate?

A. I don't have a ballpark estimate. If you want to know is it over ten, I would say yes, I'm reasonably certain it is over ten, but I do not have any ballpark estimate of the total.

MR. SOBOL: The plaintiffs will stipulate it's over ten.

BY MR. KNAPP:

Q. And how much time have you spent working on your report and the models that feed into your report?

A. I have spent, I believe it is on the order -- I meant to check this for sure. I believe it's on the order of 200 hours.

Q. 200 hours since you were retained in June of 2018?

A. That's correct. That would be from the time since I was retained in June of 2018.

Q. I'm going to hand you what I'm marking as Cutler Exhibit 1 --

(Whereupon, Cutler Exhibit Number 1 was marked for identification.)

BY MR. KNAPP:

Q. -- which is a copy of your report.

MR. KNAPP: Does anybody else need a copy?

MR. SOBOL: I didn't bring one.

MR. KNAPP: (Handing).

MR. SOBOL: Thank you.

BY MR. KNAPP:

Q. All right. I'm going to direct your attention to Appendix III-A, which is towards

the back, actually maybe about halfway through. Is Appendix III.A your CV?

A. Yes, Appendix III.A is my CV.

Q. Is it accurate?

A. Yes. This is an accurate CV for me.

Q. Does it include all of your prior testimony as an expert?

A. Yes, the CV includes -- or rather does not have any prior testimony since I have not testified before.

Q. So you've never testified as an expert in any legal proceeding before?

A. That is correct. I have never testified as an expert in a legal proceeding before.

Q. Have you testified in any capacity?

A. No, I have not testified in any capacity.

Q. Is there anything else beyond what's listed in Appendix III.A, your CV, that you believe qualifies you to offer the opinions that you've offered in this report?

MR. SOBOL: Objection.

A. The CV does not list several things.

One is it does not list the content of the courses that I've taught which are relevant to this case. The CV does not list the students that I've advised, many of whom have done work that's relevant to this particular case. The CV does not reflect articles that I have refereed or that I've been the editor for at various publications which are also relevant to the case. The CV does not list articles in the field of health economics or in other areas of economics which I have read because of my expertise in health economics which are also relevant to the case.

BY MR. KNAPP:

Q. Which courses have you taught that you believe are relevant to this case -- strike that.

Which courses have you taught that you believe are relevant to your qualifications as an expert in this case?

A. I think two courses are particularly relevant. The first one is a course that I teach on health economics, a graduate course on health economics, Economics 2465 at Harvard,

Health Economics.

The second course which I teach which I believe is relevant is a course for undergraduates. The current title of the course is Why is There No Cure For Health. In the past the course had the title The Business and Politics of Health. That was the most recent name. There were also other names for the course at previous points in time.

Q. In either of those courses, do you discuss the opioid crisis in any way?

A. Yes, the opioid crisis comes up in both of those courses.

Q. In either of those courses, do you discuss the causes of the opioid crisis?

A. Yes, as part of teaching about them we discuss the causes of the opioid crisis.

Q. And what do you recall discussing about the causes of the opioid crisis in these courses?

A. In these courses part of my goal -- so I have two goals in these courses. The first one is to make students aware of what the literature is, so I indicate to them the --

maybe I should say three goals.

So the first one is the literature, so I indicate to them what is the relevant literature on the causes of the opioid crisis, some of which is cited in the -- my report, although obviously there are things that are in addition to that, so I would make them aware of the literature.

Second, in the discussion of healthcare topics in general that are related to individual behaviors and are related to pharmaceutical policy, I would often make mention of the fact that there would be implications of this in one's thinking about the opioid crisis even if that specific topic that I was covering was not specifically the opioid crisis.

Third, I would also point out to them the importance of thinking of looking at research that is not just the economics research but a lot of the epidemiologic research, a lot of the public health research that is related to the opioid crisis. I would refer them to not just journal articles and academic writings, but

to other writings in more general interest journals or books that would be appropriate. And I would direct students who are interested towards those topics as well, towards those -- towards those readings as well.

Q. In any of these courses did you attempt to identify with any specificity the causes, or what you believe are the causes of the opioid crisis?

A. Generally not with certainty. The -- I would give to them some of what the literature spoke about in terms of the various debates in the literature. I didn't attempt to do that because I myself didn't have a view, and I formed a view in the course of doing this report.

Q. And when you mentioned the debates in the literature, what are some of the factors in the literature that are -- that academics point to as potentially being a cause of the opioid crisis?

MR. SOBOL: Objection.

A. If you look in the literature and, for example, some the papers, particularly by

Professor Ruhm bring this out, there is an issue as to how much of the opioid crisis is a result of misconduct on the part of the defendants in this case versus how much is a result of the fact that the economies of many areas have done less well than people would like, and so whether changes in economic and social factors are responsible for a greater portion of the opioid crisis.

BY MR. KNAPP:

Q. Is it fair to say there's still a debate in the academic literature about the causes of the opioid crisis?

MR. SOBOL: Objection.

A. I don't know that I can characterize the literature as a whole. There are a number of papers that are being written. By and large the papers tend to come to a fairly similar conclusion. So I believe that the weight of the evidence supports the conclusions that I reached in this report.

I don't think I'm qualified to talk about the view of the vast bulk of researchers in the area because I haven't seen anything. I

have no data that suggests what are the opinions of the vast bulk of researchers in the area.

BY MR. KNAPP:

Q. You mentioned students that you've advised. Have you advised any students researching the causes of the opioid crisis?

A. I have some ongoing students who are researching the causes of the opioid crisis. There are no students that have graduated with dissertations or papers that have been published for whom I was a primary adviser and that addressed the causes of the opioid epidemic.

Q. Okay. Are all of the opinions that you plan to give at trial in this matter contained within your report?

A. Yes. This report has all of the opinions that I intend to present.

Q. And sitting here today testifying, do you believe that the opinions in your report are still accurate?

A. Yes, I believe that the opinions in my report are still accurate.

Q. And is there anything in your report that you intend to change?

A. No, there is nothing in my report that I intend to change.

Q. So, Professor Cutler, you're a healthcare economist, right?

A. That's correct. My -- one of my areas of expertise is in healthcare economics.

Q. What do you consider your other areas of expertise?

A. The primary fields that I had when I was in graduate school in which I took my general examinations were public economics and international economics. I no longer consider myself an expert in international economics. It's not an area I've done any research or teaching since my dissertation, since my Ph.D. I do still advise students in areas of public economics, in areas of applied microeconomics generally, including public economics, labor economics, industrial organization, any number of applied econometric and economic topics, so I consider myself somewhat of an expert in those areas, even if the vast bulk of my personal research is in the area of health economics.

Q. Any other areas that you consider

yourself an expert in?

A. No, I would leave it at those areas.

Q. You're not an expert in addiction?

A. There are parts of health economics literature that have to do with addiction and models of addiction, and those are areas that I teach, that I have written about, that I consider myself an expert in, so certainly on the economics of addiction I consider myself an expert. In terms of any of the medical components of addiction, whether it's changes in brain activity or other type of activity, those I am not an expert in.

Q. You're also not an expert in addiction psychology?

MR. SOBOL: Objection.

A. No, I'm not an expert in addiction psychology.

BY MR. KNAPP:

Q. Not an expert in opioid use disorder?

A. To the extent that opioid use disorder is related to economic concepts, for example, as it's used in economic studies about the impact of the opioid epidemic or the extent of the

opioid epidemic or the data sources that are involved in learning about the opioid epidemic, then those are areas that I am expert in. To the extent that it involves physiological issues about opioid use and its impact on the human body or psychological or physical manifestations of that, those are areas where I'm not an expert.

Q. You're not an expert in pharmacology?

A. If by pharmacology you mean the impact in the body of certain medications, then no, I'm not an expert on that.

Just to be clear, if by pharmacology you mean the economics of the pharmaceutical industry, that is a topic that I have taught, that I have written some about, that I have read about, and so those are areas where an economist would be an expert.

Q. You're not an expert in epidemiology?

A. Again, I want to differentiate different types of epidemiology. There are certain types of epidemiology that do involve economic expertise. For example, models of spread of epidemics are something that I teach

and I use in my research, models about how economic factors influence epidemiological outcomes and population level outcomes, those are areas in which I do research and I teach and I consider myself an expert. In terms of other aspects of epidemiology that get into more clinical issues, that, I would not be an expert in.

And just to go back to the first part in terms of thinking about other areas that have -- of economics that are like epidemics, for example, things like the spread of obesity, smoking, alcoholism, thinking about the relationships, the similarities and differences across those different areas, those are also things that economists in general, and I in specific, have looked at, and so I do consider myself an expert in those areas.

Q. Do you consider yourself an expert in criminology?

A. I have done some research on crime, and there are areas of crime -- of the crime literature that have been very much within the economic context, and they are things that are

addressed by health economists.

For example, in this particular matter there are issues about estimating the aggregate costs of the opioid epidemic for which crime has been an outcome, and those have been looked at by economists, health economists and other applied microeconomists. So there are a good part of the literature that happens within the economic literature, and it is something that I'm quite familiar with.

There are other parts of the criminology literature that are -- that I am less specific -- that I'm less familiar with, and there are other areas of the criminology literature where I would not consider myself an expert.

Q. You're not an expert in law enforcement?

A. Law enforcement, again, has an issue where some of the areas of law enforcement do come into economic analysis. So, for example, there are quite a number of issues in opioids with respect to policies that governments undertook to try to address the opioid epidemic,

ranging from closing pill mills and trying to stop prescribing or prosecute doctors who were believed to be inappropriately prescribing, and a variety of other law enforcement actions. Those areas of law enforcement are areas that I know about, that I have read about, that I teach about as they arise, both in this context and in the context of other related behaviors or epidemics.

Then there are other areas of law enforcement where I do not consider myself an expert having to do with certain aspects that are very separate from what economists do that have to do with -- I won't even try and characterize them, but other areas of law enforcement for which I would not be an expert.

Q. Not an expert in toxicology?

A. With respect to the specific issue of how a certain drug affects certain cells or other parts of the body, no, that is not an area where I would be an expert.

Q. You're not an expert in autopsies?

A. Analysis of -- I want to differentiate it as I have with some of the other areas that

you've asked about into two parts. One is using data on autopsies to, for example, estimate, to, for example, use information on people who are dying of particular causes and to identify how many people are dying of particular causes over time and how that relates to things that may be going on in the world, then use -- then that is an area where I am an expert.

I have used mortality data in many, many studies. Many of the results of those studies come from autopsy analyses, although not all, but many do, and so the use of data from autopsies with respect to cause of death and the number of people dying and what they're dying of and so on is an area in which I'm an expert.

In terms of clinical analysis of would I be -- would it be appropriate for me to opine upon whether a particular autopsy was done correctly or what tests in a particular autopsy should have been done to determine a particular cause of death, that is not an area in which I am an expert.

Q. Not an expert in pain management?

A. With respect to pain management, there

is a component of the literature on pain that has been involved in economic and general social science applied microeconomics work. Those are areas where I am familiar.

I teach in my classes, for example, about disability insurance. I do research on disability insurance. Many people who are on disability insurance are on disability insurance because of pain related issues, so the whole economics of pain as in -- as it affects individuals and their labor supply decisions, pain as it affects individuals and their receipt of public insurance programs such as disability insurance, pain as it affects individuals and the receipt and cost of medical care through medical care services, those are examples of areas of the study of pain where I consider myself an expert.

There are other areas of pain where I do not consider myself an expert. So, for example, areas about what precisely would be -- what precisely is happening when a person feels pain in a particular part of the body and which types of interventions one should think about

for each particular type of patient and each particular duration or type of pain, those are areas where I would not be an expert.

Q. Have you ever taken a prescription opioid before?

A. No, I have never taken a prescription opioid.

Q. You understand that the prescription opioids at issue in this lawsuit are approved by the FDA?

A. I do understand that the prescription opioids in this -- at issue in this lawsuit were approved by the FDA.

Q. Bear with me one second.

And you understand that drugs may be approved by the FDA even if there are known risks associated with them, right?

A. My understanding of the FDA process is that drugs can be approved even if there are known risks.

Q. Setting aside the economic study or economic impacts of the FDA, you don't consider yourself an expert in the FDA, do you? Again, setting aside -- I understand you're going to

tell me you're -- from an economic perspective you've looked at this. But setting that aside, you don't consider yourself an expert in the FDA?

MR. SOBOL: Objection.

A. Let me just make sure what I'm setting aside, which is I'm setting aside the economics of pharmaceuticals and as the FDA relates to that in terms of the costs of drug development and the impact of the FDA on how -- which drugs are sold and how they're marketed and things like that, all of which are issues associated with economics and that I am an expert.

The part of the FDA which is the specific basis that any particular FDA review panel or an FDA commissioner would use in order to decide whether -- which -- the specific criteria would be used to decide whether a particular drug would be approved or not, that's not an area in which I am an expert.

BY MR. KNAPP:

Q. In areas where more drugs that have known risks are prescribed, you would expect to see more adverse outcomes, right?

MR. SOBOL: Objection.

A. I don't necessarily agree with that statement, no.

BY MR. KNAPP:

Q. Why not?

A. So there are many reasons why I don't think that's true. Let me give just one example, and then if you wish I can present other examples.

One example is, for example, if the drug is marketed and used only as appropriate, and where the pharmaceutical companies and the distributors exercise the appropriate actions to make sure that the drug is used only as appropriate, and drugs are used only as appropriate, in that circumstance one would not expect the number of medications to be related to the amount of inappropriate use of the medications in any way.

Q. So my question wasn't about inappropriate uses. I'm sticking to appropriate uses of the medicine.

If a medicine has known adverse risks associated with taking the medicine, would you

expect to see more adverse outcomes in a population that takes more -- or consumes more of those drugs than in other areas?

MR. SOBOL: Objection.

A. Let me answer the question that I think you're asking. If each drug -- if each individual taking it has, for example, a probability of having an adverse outcome, let's say that's P, if more people take the drug, so say N is the number of people who take the drug and P is the probability that they have an adverse outcome, then the number of -- the actual number of adverse outcomes will increase proportionately with the number of people taking the medication, as long as the -- which, as long as the P is constant, and I believe that's the assumption that you're making here.

Q. Now, one of the studies that you rely on in your report is the Evans study from March of 2019 related to the reformulation of OxyContin, is that right?

MR. SOBOL: Objection.

A. Yes, that is correct.

BY MR. KNAPP:

Q. You know what study I'm referring to?

A. Yes, I do know what study you're referring to.

Q. The authors state in that piece that "When used as directed, opioids are an important element of fighting acute and chronic pain."

Do you agree with that statement?

MR. SOBOL: Objection.

A. I'm not a medical expert, and so I don't have an expert opinion as to which patients should be prescribed opioids, or what the delineation between appropriate and inappropriate use of opioids would be.

BY MR. KNAPP:

Q. So in connection with your model and the opinions that you're offering in this case, you don't have any opinion on whether opioids can be appropriately prescribed for, say, chronic pain?

MR. SOBOL: Objection.

A. The models that I built for this particular case do not involve any assumptions as to whether the -- in this case the drug shipments were for appropriate or for

inappropriate uses. It's not something that I needed to consider here.

BY MR. KNAPP:

Q. And it's not something that you considered in connection with your report at all?

MR. SOBOL: Objection.

A. It was not necessary for the report for me to delineate between appropriate and inappropriate uses of the medications.

BY MR. KNAPP:

Q. I understand it wasn't necessary.

My question was, you did not consider it, did you?

MR. SOBOL: Objection.

A. Because it was not necessary, I did not make any determination as to whether the shipments were for appropriate or inappropriate purposes.

BY MR. KNAPP:

Q. I'm going to hand you what I'm marking as Cutler Exhibit 2.

(Whereupon, Cutler Exhibit Number 2 was marked for identification.)

BY MR. KNAPP:

Q. What is Cutler Exhibit 2?

A. Is that a question for me?

Q. Yes.

A. Okay. Cutler Exhibit 2 is a preliminary analysis that I did on prescription medication and SSDI and SSI enrollment.

Q. All right. I want to direct your attention to Page 38, although I guess it's really the first page of text. And in the second full paragraph, do you see that in the second sentence it says, "On the one hand, greater availability of pain medications may increase the ability of people with musculoskeletal ailments to remain active and working."

Do you see that?

A. Yes, I do see that.

Q. You understand that greater availability of pain medications may increase the ability of people with musculoskeletal ailments to remain active and working, right?

A. Yes.

Q. And you understand that there are

studies of people with cardiovascular disease, vision problems, and mental illness that it's suggested that therapeutic advance in the area of pain medicine and pain management has led to improved physical and mental health, right?

A. No, that's not correct.

Q. Do you see the third sentence there?

A. Yes, I do.

Q. Do you see it says "Studies of people with cardiovascular disease, vision problems and mental illness have suggested that therapeutic advance in these areas, the areas of greater availability of pain medications, has led to improved physical and mental health"?

MR. SOBOL: Objection.

A. That sentence is -- that sentence is not referring to therapeutic advances in areas of pain management. That sentence is referring to therapeutic advances in areas of cardiovascular disease, vision problems, and mental illness.

I'd be happy to expand on that. For example, the Chernew, et al study from 2015, if you look in the references, you'll see that that

was a study on which I was a co-author, and that study was looking at improvement in disability-free life expectancy in US population. The improvement in disability-free life expectancy in the US population is to a great extent driven by the fact that fewer people are dying of and fewer people are impaired by cardiovascular disease than used to be the case. And in addition, the second element that we focused on there is fewer people impaired by vision problems.

In each of those areas what we did in that paper is we went through, we looked at the nature of the medical advances that may have been associated with improvement in those areas.

In the first case, in the case of cardiovascular disease, what we looked at were primarily medications, cholesterol lowering agents, blood pressure reducing agents, antidiabetic agents, aspirin, a variety of different medications that improved the survival of people with cardiovascular disease, and that reduced the disability associated with cardiovascular disease for people who had

experienced cardiovascular disease, both of which led to increased life expectancy in the US population.

In the second case in the area of vision problems we were looking specifically at the share of people who reported that they had difficulty seeing over time, which is actually a very big component of people being disabled in the US elderly population as people report that they have difficulty with vision. The biggest change among people who have vision impairment over time is that cataracts used to be a very disabling condition among the elderly population, and that's increasingly less so, to a great extent because cataract surgery has become much easier and much more common. So what you observe in the data is a very large increase in cataract surgery over time associated with a very significant reduction in the share of people who are experienced vision problems which they associated with cataracts.

Q. Professor --

A. The point that we make in that paper is that both of those types of medical advances

may have had enormous impact in terms of the population's disability adjusted life expectancy. That paper did not consider pain medication in any way.

Q. So, Professor Cutler, you've received research funding from pharmaceutical manufacturers, right?

A. That's correct, I have received research funding from pharmaceutical manufacturers.

Q. Including Pfizer?

A. That's correct, I have received research funding from Pfizer.

Q. How much in research funding have you received from Pfizer?

MR. SOBOL: Objection.

A. I don't have the specific number off the top of my head.

BY MR. KNAPP:

Q. Can you estimate?

MR. SOBOL: Objection.

A. My estimate would be that I've received probably, I would guess, maybe 25,000 to $50,000 in research funding from Pfizer.

Q. And when did you receive that funding?
A. It was a number of years ago. One of my ongoing research projects, if I'm not mistaken, the direct funding from Pfizer would have been about a decade ago.
Q. And what study or studies did Pfizer provide research funding for?
A. What Pfizer was interested in, which is a subject that I do work on, is what is the economic and social impact of medical advance, particularly pharmaceutical advance. And so some of the work, not all of the work, but some of the work I've done on cardiovascular disease over time, which has been a subject of a number of areas of research, a number of papers that I've written, some of that research was funded by Pfizer because I wished to explore things having to do with the impact of pharmaceuticals on populations', for example, disability adjusted life expectancy or populations' ability to engage in different activities.
Q. Did the source of the funding impact the analyses that you ran in connection with the work that you were doing?

A. The source of the funding did not influence the analyses that I ran or the conclusions that I reached.
Q. So you were able to conduct analyses independent of the funding sources?
A. That is correct. My analysis was independent of the funding sources.
Q. And so you recognize that academics or doctors can conduct analyses and reach conclusions independent of the sources of funding that they receive?
MR. SOBOL: Objection.
You can answer.
A. I do believe that academics can conduct studies independent of the funding that they reach -- excuse me, independent of the funding that was provided. The results can be independent of the funding that was provided.
BY MR. KNAPP:
Q. Do you know if Pfizer and any of its affiliates ever manufactured or marketed prescription opioids?
A. I do not recall specifically whether Pfizer or any of its affiliates manufactured or

marketed opioids.
Q. Did you attribute any harms in your report to Pfizer?
MR. SOBOL: Objection.
A. In this report I do not attribute harms to any specific company.
BY MR. KNAPP:
Q. You attribute harms to defendants, right?
A. That is correct. In this report the harms are attributed to defendants.
Q. All harms are attributed to all defendants, right?
A. Not all harms are attributed to all defendants, no.
Q. All harms that are the result of the calculation that you do and the regressions that you run are attributed to the defendants, right?
MR. SOBOL: Objection.
A. That's correct. The harms here are attributed generally to the defendants.
BY MR. KNAPP:
Q. Is Pfizer a defendant?
A. I do not recall for certain the answer

to that question.
Q. Professor Cutler, do you know the names of all of the defendants that you're attributing harms to?
A. I have known them. Whether I could recite them all now, I don't know that I could recite them all now.
Q. Why don't you take your best shot at it.
MR. SOBOL: Objection to the form.
You can answer.
A. The reason why I'm hesitating is because I -- what I -- the way that I've done this most in my mind is to think about the different molecules that are involved, and so what I then want to do is to relate the different molecules to the defendants.
So for example, the one that's probably been written about the most in the economics literature is OxyContin, for which there was -- the biggest manufacturer was Purdue. There were also -- there was a joint marketing agreement, I know, for a certain period of time, although I'm going to get the

company name wrong in terms of who is -- which -- who is the company who had the joint marketing agreement. There were fentanyl patches for which I know INSYS was one of the providers. There were others as well, although I don't remember the names. I also remember having gone through this as part of the litigation.

One of the reasons why it's difficult is because companies acquired other companies at different points in time, so the names of the companies changed. Allergan was obviously involved. Mallinckrodt was involved. There were -- I'm trying to remember some of the other -- Endo Pharmaceuticals was involved. I'm trying to remember back.

There was a time where, of course, we looked at the tables that are in -- they may -- they may be in Professor Rosenthal's appendix which has the tables of all the defendants and how much they shipped in each year, so let me not -- I don't want to implicate any company by saying it if it's not the case, so let me stop there so that I don't make a mistake.

Q. Any other companies that you can think of that you've attributed harms to in this case?

MR. SOBOL: Objection.

BY MR. KNAPP:

Q. In your report. Strike that.

Any other companies you can think of that you've attributed harms to in your report?

MR. SOBOL: Objection.

A. I do not attribute harms in the report to any single company.

BY MR. KNAPP:

Q. Well, by implication, if defendants are specific companies, are you attributing harm to particular companies, or no?

MR. SOBOL: Objection.

A. There are two types of defendants here. Let me answer your question that way. There are two types of defendants. There are the manufacturers, and there are the distributors, at least from an economic perspective, that's how I think about them. So I was giving you, obviously, some of the manufacturers.

In terms of the distributors, there

are a number of distributors as well. There are also -- distributors are both those involved in shipments as well as those involved in sales, for example, Walgreens and CVS, but there are also the shipment companies, for example, Cardinal Health and McKesson and other companies.

But again, I don't want to implicate any without being absolutely correct, so I will -- I will not say any more company names.

BY MR. KNAPP:

Q. Let's turn to Paragraph 31 of your report. Are you at Paragraph 31?

A. Yes, I am.

Q. So you made no attempt to uniquely apportion harms resulting from actions by any individual type of defendant, right?

A. That's correct. I did not attempt to apportion harms to any individual type of defendant.

Q. And you also made no attempt to uniquely apportion harm to any individual defendant, correct?

A. That is correct, I did not make any

attempt to apportion harm to any individual defendant.

Q. And your model does not calculate the percentage of tortious conduct that proximally caused any harm that is attributable to the plaintiff, doesn't it?

A. The model does not attempt to apportion any harm to any specific party.

Q. Including the plaintiff?

MR. SOBOL: Objection.

A. That's correct, including the plaintiff.

BY MR. KNAPP:

Q. And including each defendant, right?

MR. SOBOL: Objection.

You can answer.

A. That is correct. The model does not determine the portion of harm for any individual defendant.

BY MR. KNAPP:

Q. And the model does not calculate the percentage of harm that was proximately caused by any non-defendants either, right?

MR. SOBOL: Objection.

A. That is correct. There is no apportionment of harm to any non-defendant.
BY MR. KNAPP:
Q. And you made no attempt to calculate whether any particular defendant was more than 50 percent at fault, did you?
MR. SOBOL: Objection.
A. I did not make any attempt to determine whether any individual defendant was more than 50 percent at fault.
BY MR. KNAPP:
Q. You made no attempt to calculate the percentage of fault of any individual defendant?
A. I made no attempt to calculate the proportion of fault due to any individual defendant.
Q. Now, the plaintiffs have recently represented that they may proceed to trial with only a subset of the defendants that are currently in this case. If that happens, would you need to redo your model?
MR. SOBOL: Objection.
A. The model that I estimate translates the shipments of opioids into harms. It then

takes as an input the share of opioid shipments which are due to misconduct on the part of the defendants. If the court or for any other reason -- if the court wishes to know the impact of any particular single defendant or subset of defendants, the model could be used to do that because it would take as input those harms which are related to that specific defendant or set of defendants.
BY MR. KNAPP:
Q. And what you're referring to when you say the share of opioid shipments which are due to misconduct on the part of defendants, are you referring to Professor Rosenthal's conclusions?
A. In the body of the report, the share of shipments that result from misconduct on the part of the defendants comes from Professor Rosenthal's conclusions.
Q. And so you would have to redo your report to reduce the amount of shipments that you're calculating the percentages off of, is that right?
MR. SOBOL: Objection.
BY MR. KNAPP:

Q. Strike that.
If any defendant is not in the first trial, you would have to redo your model to remove the percentages of shipments associated with that defendant, correct?
MR. SOBOL: Objection.
A. I would like to make a distinction. The model is the model that translates shipments into harms. That model would not need to be reestimated. The inputs to the model, which is -- which is the percentage of shipments which are due to misconduct, that input would change, and so, therefore, the harms would change, but the model that's used would not change.
BY MR. KNAPP:
Q. Professor Cutler, you made no attempt to link any alleged harm to any particular prescription, is that right?
MR. SOBOL: Objection.
A. I did not relate the harm to any particular prescription.
BY MR. KNAPP:
Q. And you didn't relate the harm to any particular shipment either, did you?

MR. SOBOL: Objection.
You can answer.
A. The harm is related to the aggregate of shipments to particular areas, so it's not on a shipment-by-shipment basis, but it is related to the shipments going to different areas.
BY MR. KNAPP:
Q. But you did not attempt to apportion harm and link it to a particular shipment, is that correct?
A. Can you just explain what you mean by "a particular shipment"?
Q. X company sent Y MMEs to Z company.
MR. SOBOL: Object to the form.
You can answer.
A. No, it did not relate any particular shipment to harms.
BY MR. KNAPP:
Q. And you made no attempt to link any particular type of opioid to the harms you analyzed in your report, right?
A. That's correct. We took all the opioids together here.
Q. So you treat for purposes of your

report all opioid medicines as if they're the same, right?

MR. SOBOL: Objection.

A. They're not the same in terms -- they're treated as similar given the MMEs, given the milligrams of morphine equivalent. That differs across medications. So, for example, one prescription of one medication, say 30 pills, and 30 pills prescription of a different medication, they have different milligrams of morphine equivalents and, therefore, they would contribute differently to the shipments which are then related to the harms.

BY MR. KNAPP:

Q. Other than making the conversion for milligrams -- morphine milligram equivalence, you treated all opioid medicines as if they were the same, correct?

MR. SOBOL: Objection.

A. Other than for the MME conversion, they were added together -- there's another issue, which is two of the categories of opioid medications are used as both treatments for pain and as treatments for addiction, and so we had

to decide those were buprenorphine and Methadone, so in the end the shipments variable that I decided to use does not include shipments of buprenorphine or of Methadone because using the data that we have, we cannot separate out which of those shipments are for treatment of pain and which of those shipments are for treatment of opioid addiction.

Q. So I'm focused on shipments that you did include in your analysis. Other than making the conversion for morphine milligram equivalents, you treated all opioid medicines as if they were the same, right?

MR. SOBOL: Objection. Form.

A. Yes. Once drugs had been converted to milligrams of morphine equivalent, and once we had decided on which drugs to include, then all drugs contributed equally, and we looked at the milligrams of morphine equivalency as a whole.

BY MR. KNAPP:

Q. So you assume in your model that all opioids have the same likelihood of contributing to the harms that you analyzed regardless of the particular characteristics of the opioid, is

that right?

MR. SOBOL: Objection.

A. No, that's not the way I would phrase it.

BY MR. KNAPP:

Q. Well, so, for example, you treated, after making your MME adjustment, you treated oxycodone and hydrocodone as if they were the same, right?

MR. SOBOL: Objection.

A. What we are estimating in these models is the average impact, so the impact of the average shipments on -- at least in the direct model we're estimating the impact of the average shipments on harms. That doesn't have to mean that each individual drug has the same impact; it rather means that what we're getting is on net the relationship between them, that is the average relationship.

BY MR. KNAPP:

Q. Did you make any adjustments in your model for the active ingredient included in any of the opioid shipments that you looked at?

A. I did not estimate the model

separately for different active ingredients.

Q. And you understand that different types of opioids have different potential risks for abuse and addiction, right?

A. I'm not a toxicologist, so I don't -- I do not have an expert opinion as to whether different types of opioids have different potential for addiction.

Q. But you assume for purposes of your report, at least implicitly, that all different types of opioid medicines that you looked at in your report were equally likely to contribute to harms, right?

MR. SOBOL: Objection.

A. No, that's not correct.

MR. KNAPP:

Q. How did you adjust for the -- other than the morphine milligram equivalent adjustment that you made, how did you account for the different characteristics of particular types of opioids?

A. If you're asking about the direct model, again what we're estimating here is the average effect, so it is the average impact of

opioid shipments in MMEs on harms. That does not require that each medication have the same impact. Rather, it's saying what is the typical relationship between shipments of MMEs and harms across areas.

To the extent that different medications have different harms and that they were shipped differently in different areas, that would then be one of the factors that is in the residual. That would be a difference across areas. But the model does not require that the harms be the same for each particular type of opioid.

Q. So looking back at Paragraph 31, it says "The analysis presented here does not attempt to uniquely apportion." What does "uniquely apportion" mean in that sentence?

A. When the sentence says the article -- "The analysis presented here does not attempt to uniquely apportion harm resulting from actions by any individual type of defendant," uniquely in terms of estimating each individual defendant's contribution to the total harm.

Q. So, for example, you don't have any

opinion regarding any harms that were specifically caused by Allergan Finance, right?

A. In this model we -- I do not have any particular -- I do not have any harms that are attributed to any particular defendant.

Q. And so going back to the point that we were just talking about, if a particular defendant manufactured or distributed a type of opioid that had less risk for abuse than other types of opioids, your model doesn't make any adjustments in terms of allocating percentages of harm to that defendant based upon the types of opioids that they sold?

MR. SOBOL: Objection.

A. In this model there is no allocation to any single defendant, and so, therefore -- let me just say there is no -- there is no allocation to any single defendant.

BY MR. KNAPP:

Q. Well, isn't it possible, Professor Cutler, that you could rule out certain defendants as having contributed to some of the harms that you looked at?

MR. SOBOL: Objection.

A. The model that I have here is not designed to do that. One would need to develop a different model to do that for each specific defendant. I haven't developed that model.

BY MR. KNAPP:

Q. Well, let's just say that a manufacturer didn't start manufacturing prescription opioids until 2010, okay? That's the hypothetical here. Your model would attribute harms from 2006 to 2009 to that defendant, correct?

MR. SOBOL: Objection.

BY MR. KNAPP:

Q. As part of the group of defendants, they are attributed harm according to your model, is that right?

MR. SOBOL: Objection.

A. What the model gives is the harm that results from all the defendants together. If the court wished to know about the impact of any individual defendant, the way to do that would be through the inputs that Professor Rosenthal provides where she provides the share of shipments in each year that are a result of

misconduct. In the case of the model here, she provides the share of the shipments in each year that are a result of misconduct on the part of defendants as a whole. If one had data on the share of shipments that result from a specific defendant in a particular year, one could feed that into the model here and calculate -- the model that I developed and calculate the harms from that.

BY MR. KNAPP:

Q. But you haven't done that here, right?

A. I have not done anything with respect to any specific defendant.

Q. And so to the extent that a defendant wasn't marketing, manufacturing, or distributing from 2006 to 2009, you still attribute harm to that defendant, correct?

MR. SOBOL: Objection.

A. That's not correct.

BY MR. KNAPP:

Q. Why is that not correct?

A. It's not correct because it is attributing the harm to the defendants as a whole. It is not attributing it to any specific

defendant. And there is nothing in this report that says in order to attribute it to a specific defendant, follow the following procedure.

Q. All right. In Paragraph 31 you also refer to indivisible harms. What are indivisible harms?

A. Can you just refer me to the very specific wording?

Q. It's in Paragraph 31, it's in the third line.

A. Thank you very much.

An indivisible harm is a harm where -- at least as I was using the term, it's a harm where multiple parties may be responsible for the same harm.

So, for example, in a situation where a manufacturer inappropriately promotes a medication and where a distributor inappropriately does not flag a suspicious shipment, then that is an indivisible harm, at least as I'm using the word, because there are multiple parties, that each were at fault.

Q. And how did you determine that the harms that you analyzed in your report were

indivisible?

MR. SOBOL: Objection.

You may answer.

A. I did not make a -- I did not make a determination in this report as to which specific harms resulted from, for example, manufacturers and which specific harms resulted from distributors, so I did not do a division of the harms that way.

BY MR. KNAPP:

Q. My question was, how did you determine that these particular harms were indivisible?

MR. SOBOL: Objection.

A. This is a statement not that I determined that, but rather it was a reason why I was bolstering the argument in the first sentence, which is in part why I did not try to uniquely apportion harm. And I was giving an example of why one might not want to try to uniquely apportion harm as a specific example of which might be harms that are indivisible.

BY MR. KNAPP:

Q. So do you -- strike that.

Do you have an opinion whether these

harms are indivisible, or are they divisible?

A. I do not have an opinion about that.

Q. All right. If we go to the next clause of that sentence, it says "It is unlikely that a unique attribution of harm to each contributing" possible -- "each contributing" -- excuse me -- "party is possible."

Do you see that?

A. Yes, I do see that.

Q. Why is it unlikely?

A. I'm going to tell you what I meant, which was economics language, and that may not be -- I'm not sure I'm going to get the legal words correctly, so just to give you that.

As an economic matter, if there is a harm which both parties are responsible for the full extent of the harm, for example, one party, the manufacturer, is engaged in misconduct in promoting the medication inappropriately and another party, the distributor, engaged in misconduct by not noting the suspicious shipments, then in essence both are responsible for the harm, and as an economic matter one could not assign a percentage of the blame to

each party because the harm would not have occurred unless -- it had to be the case that both parties failed their responsibilities in order for the harm to occur.

Q. And so here did you conclude that it's impossible to uniquely attribute harm to each contributing party?

MR. SOBOL: Objection.

A. No, I did not conclude that it was impossible to do so. I merely noted why I was not doing so here.

BY MR. KNAPP:

Q. So -- strike that.

Do you agree that there are parties that are not defendants here that contributed to the harms that you analyzed in your report?

MR. SOBOL: Objection.

A. That sentence is too vague for me to give a yes or no answer to.

BY MR. KNAPP:

Q. Do you believe that there are individuals or entities that contributed to the harms that you analyzed that are not defendants in this lawsuit?

MR. SOBOL: Objection.

A. I don't make a determination here as to who gets what portion of the blame, so that's not -- that's not an area that I have an opinion upon.

BY MR. KNAPP:

Q. Your model cannot rule out that there are individuals or entities that contributed to the harms that you analyzed that are not defendants in this case?

MR. SOBOL: Objection.

A. I haven't made any -- the model does not rely upon any specific delineation as to who it was that caused the harm.

BY MR. KNAPP:

Q. Now, Professor Cutler, that wasn't my question.

My question was, your model does not rule out that there are individuals or entities that contributed to the harms that you analyzed who are not parties to this lawsuit?

MR. SOBOL: Objection. Asked and answered twice.

A. Again, I haven't made any

determination as to who are the parties at fault here.

BY MR. KNAPP:

Q. All right. Let's turn to Paragraph 3 of Appendix J, which is towards the back. All right. I'm looking on the second page of paragraph -- sorry, Paragraph 3 which goes on to the second page, Page 2.

Do you see the first full sentence? It says "As an economic matter, manufacturers are appropriately held liable for at least the 10 percent of the harm that distributors could not have avoided."

That refers back to the prior sentence, right?

A. That is correct, yes.

Q. What does it mean to be held liable as an economic matter?

MR. SOBOL: Objection.

A. As an economic matter, held liable would be that the blame would be attributable to them economically.

BY MR. KNAPP:

Q. And you say that if the share of the

harm attributed to manufacturers is greater than the share of harms that could have been avoided by distributors, that the manufacturers are liable for at least the difference, right?

A. Yes, that is correct.

Q. And do you have an opinion on whether the manufacturers are liable for just that difference, or if they're liable for something more than that as an economic matter?

A. As an economic matter, no, as we were talking about, the harm which is caused by failure on the part of both parties, as an economic matter there's no easy way to attribute it between the different defendants.

Q. And again, when you say there's no easy way, what you mean is you haven't done it?

MR. SOBOL: Objection.

A. What I mean is that one would have to make some type of assumptions to do it. I have not made any assumptions that would do that.

BY MR. KNAPP:

Q. All right. So if you look at Table J.1, do you see Table J.1 says the percentages -- sorry, "percent of shipments

attributable to distributors' misconduct."

Do you see that?

A. Yes, I do see that.

Q. Do you know whether the percentage of shipments that you attribute to distributor misconduct in each year is higher, lower, or the same as the percentage of shipments that you attribute to marketing misconduct?

MR. SOBOL: Objection to the form, but he can answer.

A. I have not -- I have not attributed anything specifically to marketers, marketers' misconduct.

BY MR. KNAPP:

Q. When I say for -- purposes of this question, when I say marketing misconduct, I mean the part of your analysis that relies on the percentages from Professor Rosenthal's report. Do you understand that?

A. Okay. That -- so just to be clear, that's not what I -- the word marketing is what threw me off there since Professor Rosenthal gave me an estimate which is not specific just to marketers.

Q. What is your understanding of what the percentages are that you got from Professor Rosenthal?

A. Professor Rosenthal gave me an estimate of the share of shipments which are due to misconduct on the part of the defendants as a whole.

Q. And so you don't understand Professor Rosenthal's percentages to be attributed to any particular defendant group, is that your understanding?

A. That is my understanding of Professor Rosenthal's percentages.

Q. And what is your understanding of the alleged misconduct that Professor Rosenthal was looking at?

MR. SOBOL: Objection. Asked and answered.

A. Professor Rosenthal was looking at the misconduct on the part of the manufacturers in terms of promoting the drugs in an inappropriate way, and of the distributors in terms of failing to identify, report, and stop suspicious shipments.

Q. Okay. So do you understand, or do you know whether the percentages in this Table J.1 that you say are attributable to distributors' misconduct are higher, lower, or the same as the percentages of harm that Professor Rosenthal attributes to defendants' misconduct?

MR. SOBOL: Objection.

A. Let me say one thing first about Table J 1. These numbers were provided to me by counsel, so I did not calculate them. I think you said when -- "the numbers that you provide." So they are in the appendix to my report, but they are numbers that were provided to me by counsel, and they were not numbers that I -- that I am saying -- I am not giving the opinion that these numbers are correct percentages associated with distributors' misconduct.

BY MR. KNAPP:

Q. But can you answer my question? Do you need me to read it back?

MR. SOBOL: Objection.

A. Yes, please read the question back.

BY MR. KNAPP:

Q. Do you know whether the percentages in

this Table J.1 that you attribute to distributors' misconduct are higher, lower, or the same as the percentages of harm that Professor Rosenthal attributes to defendants' misconduct?

MR. SOBOL: Objection.

A. I'd want to look specifically at the comparable table from Professor Rosenthal to see about each year.

BY MR. KNAPP:

Q. So you don't know?

MR. SOBOL: Objection. Asked and answered.

A. Not for each year, no.

BY MR. KNAPP:

Q. Do you know for any year?

MR. SOBOL: Objection. Asked and answered.

A. If you'd like, I would be happy to look at the specific table.

BY MR. KNAPP:

Q. Well, what is the relationship between the percentages in Table J.1 and the percentages that you received from Professor Rosenthal?

MR. SOBOL: Objection.

BY MR. KNAPP:

Q. Is there any relationship?

MR. SOBOL: Objection.

A. The percentages in Table J.1 were from Mr. McCann. I was not involved, obviously, in Mr. McCann's report. Those numbers were provided to me by counsel. My purpose in including them here was to let the court know that if it wished, one could take -- if the court wished, I could take estimates of the harm resulting from a particular group of defendants, in this case the distributors, and calculate the harms that would come from that.

These numbers, I am not -- I am not testifying -- it is not my opinion that these numbers are the correct numbers. They were given to me by counsel who asked if these were the correct numbers, what would be the harm that would -- that your model would estimate from that.

BY MR. KNAPP:

Q. So, Professor Cutler, I really need you to focus on the question that I'm asking and

just answer that question.

MR. SOBOL: Objection. He has been.

BY MR. KNAPP:

Q. My question is, what is your understanding of the relationship between the percentages in Table J.1 and the percentages that you received from Professor Rosenthal, if there is any relationship?

MR. SOBOL: Objection. Asked and answered twice.

A. The estimates in Table J.1 are the estimates of Mr. McCann about the percent of shipments that are attributable to distributors' misconduct. The estimates from Professor Rosenthal are her estimates of the percent of shipments attributable to misconduct on the part of the defendants as a whole.

BY MR. KNAPP:

Q. Do you contend that the distributors should have stopped a greater percentage of shipments than Professor Rosenthal attributes to the defendants as a whole?

MR. SOBOL: Objection.

A. I'm not -- I'm not giving an expert

opinion as to whether Mr. McCann's numbers are correct or incorrect, or how Mr. McCann's numbers compare with Professor Rosenthal's numbers. What I'm doing here is I'm saying -- I am demonstrating to the court that one can use estimates of shipments attributable to any particular category of defendants and use that to estimate the harms that result from that.

BY MR. KNAPP:

Q. All right. Let's look at Page 62 of your report. Maybe keep your hand on Table J.1 because we're going to compare them.

So on Page 62, column C, there's a column for percent of shipments attributable to defendants' misconduct, and that's the percentage you got from Professor Rosenthal, right?

A. That is correct.

Q. Okay. So let's just take -- why don't we take 1997. The number of shipments attributable to defendants' misconduct in 1997 from Professor Rosenthal is 18.2 percent, right?

A. That is correct.

Q. All right. Now let's go back to J 1.

The percent of shipments attributable to distributors' misconduct in 1997 is 49.9 percent.

Do you see that?

A. Yes, I do see that.

Q. What caused the shipments -- the incremental difference in shipments that the distributors -- you say the distributors -- strike that. What is the cause -- strike that.

Why is the percent in Table J.1 for 1997 higher than the percent from Professor Rosenthal's report?

MR. SOBOL: Objection.

A. I am not -- I don't have an expert opinion on the analysis that Mr. McCann did, so I don't have a view as to the primary sources of the difference between what Mr. McCann did and what Professor Rosenthal did.

My purpose in this appendix is to show the court how such an analysis could be used to estimate harms, not to decide which of these two estimates here is more appropriate.

BY MR. KNAPP:

Q. And you also don't have an opinion --

strike that.

Do you have an opinion on why the distributors should have stopped approximately 30 percent more shipments in 1997 than that are attributable to defendants' misconduct?

MR. SOBOL: Objection. Form.

A. I'm not -- I'm not testifying to the accuracy of Mr. McCann's analysis here. I'm showing the court how an estimate of the harms associated with a particular class of defendants could -- how the shipments associated with misconduct on the part of any particular class of defendants could be used to estimate the harms from those defendants.

BY MR. KNAPP:

Q. Do you know or have any opinion on whether the percentages in Table J.1 are reasonable in any way?

MR. SOBOL: Objection.

A. I'm not -- I do not have an opinion as to whether the estimates in Table J.1 are correct or incorrect.

BY MR. KNAPP:

Q. And what about the percent of

shipments attributable to defendants' misconduct in column C of Table 3.9, those are percentages from Professor Rosenthal's report, right?

A. That's correct. Column C of Table 3.9 is from Professor Rosenthal's report.

Q. Do you have an opinion on whether those numbers are reasonable or correct?

A. I -- as an economic matter, I understand what Professor Rosenthal did, and it makes a good deal of economic sense, yes.

Q. Do you have an opinion on whether the numbers in column C are correct?

MR. SOBOL: Objection.

A. I believe that the methodology in column C is correct, and that the data are appropriate, and that these are appropriate estimates.

BY MR. KNAPP:

Q. Now, Professor Cutler, you would agree that if the percentages in Table 1, Table J.1 of your Appendix J, III.J, if the percentages there are higher than the percentages that you got from Professor Rosenthal, something other than defendants' misconduct had to cause those

shipments, right?

MR. SOBOL: Objection.

A. No, I don't agree with that.

BY MR. KNAPP:

Q. Well, Professor Rosenthal is identifying the percentage of shipments that are attributable to defendants' misconduct, right?

A. That's correct.

Q. And so what would cause the additional percentage of prescriptions that are included in Table J.1 that are identified as attributable to distributor's misconduct?

MR. SOBOL: Objection. Scope.

A. I don't know -- as I've said, I don't know exactly how Mr. McCann did his analysis. It can be the case that different people can choose different types of analysis and reach different numbers. The fact that two individuals have estimates that are not exactly the same does not mean automatically that there is an additional party responsible. It might mean that the methodologies give different results, and that one should then compare the methodologies in greater detail to see which of

those methodologies is the more plausible methodology.

MR. KNAPP: Why don't we take a break, and we can pick up here.

THE VIDEOGRAPHER: The time is 10:39 a.m., and we're off the record.

(Whereupon, a recess was taken.)

THE VIDEOGRAPHER: The time is 11:03 a.m., and we're on the record.

MR. BADALA: Quickly before you start, we just want to confirm something. Is Carol Rendon or anyone from Baker Hostetler on the phone? I just had to, you know, state our objection to any involvement of Carol Rendon or Baker Hostetler at the deposition.

BY MR. KNAPP:

Q. Okay. On paragraph -- let's turn back to Paragraph 31 of your report. The fourth -- sorry, one, two, three, four, five -- fifth line, it says "However, as noted, such harms cannot be solely attributable to manufacturers since some harm could have been prevented had all registrants of the CSA, including distributors, met their legal obligations."

Do you see that?

A. Yes, I do see that.

Q. Is what you're referring to there that people or entities further down the causal chain between marketing by a manufacturer and someone overdosing on an opioid could have acted to prevent those harms?

MR. SOBOL: Objection. Form.

A. In the specifics of this sentence, what I'm referring to is the fact that one doesn't want to think about the harms as resulting just from the marketing.

And the specific example that I have in mind is that there were at least two sources of fault here, one is the manufacturers, and then second is the distributors who did not meet their legal obligation in this case, so that not all of the harm, even if it's -- even if it's related to the marketing, not all of the harm is just from the marketing component.

BY MR. KNAPP:

Q. And you focused on distributors based upon what you say is obligation under the CSA, right?

A. Yes, that is correct.
Q. Isn't it the case that there's other entities between a manufacturer marketing to a doctor and someone overdosing on an opioid that also could have prevented the harms?
A. Prevented is difficult. There are, of course, many entities in the causal chain here. The one that I focus on specifically is the contribution of the defendants in this case.
Q. Who are the other entities in the causal chain that you did not focus on in your report?
MR. SOBOL: Objection.
A. I don't have a delineation because I didn't seek -- I did not identify them specifically. There -- I'll just take one example here, which is a number of physicians have faced consequences of overprescribing -- inappropriately prescribing opioid medication, and so that is one example of another party that may be responsible for the misconduct here.
BY MR. KNAPP:
Q. Your model doesn't attribute any share of the harms to prescribing doctors, does it?

MR. SOBOL: Objection.
A. The model that I built doesn't by itself attribute the harms to any specific party. It then takes as an input estimates of the harms that result from misconduct of particular parties, in this case Professor Rosenthal's estimates of the misconduct resulting from the defendants in this litigation, and then it estimates the harms that result from that. But by itself the model does not consider any specific party.
BY MR. KNAPP:
Q. And so based upon the inputs in your model, you can't say whether any particular defendant is economically responsible for any of the harms you looked at, right?
MR. SOBOL: Objection.
A. The specifics of this model are to look at the relationship between misconduct and harms. I then use as an input the estimate of misconduct that's estimated by Professor Rosenthal to have resulted from the defendants in this case, and therefore, I show the harms that result from the actions of the defendants

in this case.
BY MR. KNAPP:
Q. My question was, based upon the inputs in your model, you can't say whether any particular defendant is responsible for any of the harms that you analyzed in your report, right?
MR. SOBOL: Objection. Asked and answered several times.
A. My report does not delineate the harms that result from any specific defendant.
BY MR. KNAPP:
Q. So the answer is you can't say whether any particular defendant caused any of the particular harms that you analyzed, correct?
MR. SOBOL: Objection. Asked and answered several times.
A. I'm going to be very precise. The model shows the harms that result from shipments of medications. It then uses as an input the harms -- the shipments that are a result of misconduct on the part of the defendants. It does not give an answer for the harms that result from any single defendant.

BY MR. KNAPP:
Q. Okay. We talked about doctors as entities who potentially could have prevented these harms. What about insurers who reimburse prescriptions after evaluating medical necessity, could they have prevented any of the harms that you analyzed?
MR. SOBOL: Objection. Beyond the scope of the report.
A. The report doesn't talk about any specific entity that -- doesn't give specifics on any specific entity that should have done anything other than to say that with the estimates that Professor Rosenthal gives of the misconduct, I can then give the harms that result from that.
BY MR. KNAPP:
Q. That wasn't my question.
So my question was, could insurers who reimburse prescriptions after evaluating medical necessity have prevented any of the harms you analyzed in your report?
MR. SOBOL: Objection. Scope, asked and answered.

A. I haven't made a quantitative assessment of whether insurers should have been able to prevent the harms or not.
BY MR. KNAPP:
Q. You're not able to rule out insurers as having potentially contributed to the harms you analyzed in your report, right?
MR. SOBOL: Objection. Scope of his report. Answered previously.
A. The report does not rule out any specific other entity. And in fact, in the report not all of the harms are attributed to the defendants here, so I'm not -- I'm also not attributing 100 percent of the harms to the defendants here.
BY MR. KNAPP:
Q. What about drug dealers who sell illicit opioids, could they have prevented any of the harms that you listed in your report?
MR. SOBOL: Objection.
A. I haven't done a specific analysis of drug dealers to determine whether they should have -- whether they might have done something, so I think what you're asking is -- I'm not

going to put words in your mouth. That's a mistake.
In order to answer a question like that, for sure one would need to do an economic analysis of the relevant party or parties. I haven't done an economic analysis of the relevant parties to say, oh, okay, either insurers or drug dealers should have been able to do X or Y.
BY MR. KNAPP:
Q. And so you're not able to rule them out as contributing to the harms you analyzed in your report, right?
MR. SOBOL: Objection. Asked and answered, scope.
A. The report does not rule them -- does not rule out any single defendant or rule in any single defendant as causing -- or non-defendant as causing a specific harm.
BY MR. KNAPP:
Q. And that would be true of cartels as well, right?
MR. SOBOL: Objection.
What true?

A. I'm sorry, what would be true? Can you just repeat the question?
BY MR. KNAPP:
Q. It would be -- strike that.
You can't rule out cartels that sell illicit opioids as contributing to any of the harms that you analyzed in your report, right?
A. I have not made a determination about any specific individual or group of individuals.
Q. You can't rule out cartels as contributing to the harms you analyzed in your report, can you?
MR. SOBOL: Objection. Scope, asked and answered.
A. I haven't -- I haven't estimated any harm to any specific entity or individual or company.
BY MR. KNAPP:
Q. Is there something you don't understand about my question?
MR. SOBOL: Objection. I think he answered the question, so given your prior instruction to him this morning, he did understand it.

There's no question before you.
BY MR. KNAPP:
Q. There is a question pending. Is there something you don't understand about my question?
A. I haven't done an economic analysis of any of those specific organizations, so I don't have a basis to say that I either rule them in or out.
Q. And you don't have a basis to rule in or rule out pill mills as contributing to the harms you analyzed in your report, right?
MR. SOBOL: Objection. Scope.
A. That's correct.
BY MR. KNAPP:
Q. And you don't have a basis to say whether internet sellers of illicit opioids contributed to the harms you analyzed in your report?
MR. SOBOL: Objection. Scope, form.
A. That's correct, I have not analyzed them.
BY MR. KNAPP:
Q. And you don't have a basis to say

whether individuals who divert opioids contributed or did not contribute to the harms you analyzed in your report?

MR. SOBOL: Objection. Scope, form.

A. That's correct. In this report I do not make any determination about that.

BY MR. KNAPP:

Q. You can't rule out the DEA as contributing to any of the harms you analyzed in your report, can you?

MR. SOBOL: Objection. Scope, form.

A. I have not -- no, I have not modelled -- I have not come up with an empirical estimate of the impact of the DEA.

BY MR. KNAPP:

Q. You're not able to rule out the FDA as contributing to any of the harms that you analyzed in your report, are you?

MR. SOBOL: Objection. Scope, form.

A. No, I haven't ruled in or out any action by the FDA.

BY MR. KNAPP:

Q. And you haven't -- strike that.

You can't rule out the State of Ohio

as contributing to any of the harms you analyzed in your report, right?

MR. SOBOL: Objection. Scope, form.

A. That's correct, I have not done any assessment of any of the consequence of any action by the State of Ohio.

BY MR. KNAPP:

Q. You can't rule out law enforcement as contributing to the harms you analyzed in your report, right?

MR. SOBOL: Objection. Scope, form.

A. Correct, I cannot -- I have not reached any conclusions about the impact of law enforcement.

BY MR. KNAPP:

Q. Now, going back to the DEA and FDA, don't you and Professor Gruber attribute some of the post 2010 market contraction to actions taken by the DEA and FDA?

MR. SOBOL: Objection. Scope, form.

A. The DEA and the FDA were both responding to the opioid epidemic, so their actions were not coming out of the blue. And so they -- whatever consequences there were, I

think it's -- they were trying to act with respect to the opioid epidemic, and then that played into other things that were going on.

BY MR. KNAPP:

Q. So my question was, don't you and Professor Gruber attribute some of the post 2010 market contraction to actions taken by the DEA and FDA?

MR. SOBOL: Objection. Form.

A. It's a complex answer so I want to differentiate two things. The first is whether specific actions such as the reformulation of OxyContin to be abuse-deterrent had any impact on the shift from legal to illegal opioids. The answer to that in the literature is very clearly yes. That is, the reformulation of OxyContin, for whatever reasons it was done, did have an impact on the increased use and misuse of illegal opioids. So that's one part of the answer.

A second part of the answer is that that is not coming out of nowhere. So as an economic matter, you have to say, were there precursors to that that laid the groundwork for

subsequent harms, and the precursors to that were the fact that many people were addicted to legal opioids at the time.

And so the actions affected -- actions, for example reformulation of OxyContin, affected harms in part because of other prior actions, and one shouldn't think of the policy as just coming out of the blue there.

BY MR. KNAPP:

Q. So from an economic perspective, when you have to look at precursors, how far back do you go? Because you've said you didn't look at any actions taken by the FDA in approving these medications and whether they contributed to the harms, so where do you draw the line, Professor Cutler?

MR. SOBOL: Objection. Form.

A. In this specific report I build a model to translate shipments into harms -- shipments into harms. One would then feed that into the model by attributing a certain share of the shipments to actions of different individuals or companies. One would then have to make a determination, an economic empirical

determination as to what the harm -- where the harm -- what entity or individual organization caused the harm.

And as we were talking about earlier, there may be harms that for which there are multiple factors that go into it, any one of which might have prevented it. So, for example, the fact that there were many people addicted to opioid medications combined with the fact that one of those opioid medications was made abuse-deterrent then led people to move into illegal opioids. The assignment of blame or of attribution is difficult in that circumstance for the reason we were talking about earlier, which is the fact that multiple factors contributed to it, and so, therefore, one has to make an economic determination about that.

In this specific report I did not make a determination about who was responsible for that particular harm, other than as I used the estimates from Professor Rosenthal.

BY MR. KNAPP:

Q. Do you have an opinion on whether the defendants here are jointly and severally liable

for all the harms that you identified?

MR. SOBOL: Objection. Scope.

A. I do not have a legal opinion on that, no. I have only economic opinions.

BY MR. KNAPP:

Q. And you don't have an economic opinion on whether the defendants here are jointly or severally liable for the harms you analyzed?

MR. SOBOL: Objection. Scope, form.

A. I have not done an economic analysis to apportion the harm to any specific defendant or group of defendants. I use the estimate of that that comes from Professor Rosenthal in my calculations.

BY MR. KNAPP:

Q. And so you haven't attempted to establish a causal relationship between any defendant's conduct and the harms you analyzed, correct?

MR. SOBOL: Objection. Scope, form, asked and answered.

A. The model -- the model can be used to apportion the harms that are directed to any specific defendant or group of defendants, so

the model is designed -- excuse me, the model is designed to show how shipments translate into harms, and then using the estimates of the harms that -- using the estimates of the shipments due to misconduct that come from Professor Rosenthal -- excuse me -- that come from Professor Rosenthal, it then turns those into estimates of harms.

I myself in building the model did not say -- did not make the model dependent on the harm of any specific company or group of companies.

Q. So your model didn't establish a causal connection between defendants' conduct and the harms you analyzed? Your personal model.

A. I'd like to break that into two parts. There's the impact of the defendants' misconduct on the shipments of opioids. That model is done by Professor Rosenthal. That's not my model.

The model that I have then makes a causal determination as to the harms that result from the shipments of opioids. That is a causal statement that I am making in my model.

Q. Professor Cutler, I'm going to try to ask this one more time.

Your model, your personal model, the regression model that you built, set aside what Professor Rosenthal did, did not connect any defendant's conduct to any of the harms you looked at, correct?

MR. SOBOL: Objection. Asked -- he just answered the question.

A. As a component of the model, it is not in there. As an output of the model when given the outputs of Professor Rosenthal, it then uses those estimates to produce a causal estimate.

Q. So you rely on Professor Rosenthal to establish the causal connection between -- strike that.

You rely on Professor Rosenthal to establish the alleged causal connection between defendants' misconduct and the harms that you analyzed?

MR. SOBOL: Objection. Asked and answered.

A. No. I rely on Professor Rosenthal to assess the relationship between the misconduct

on the part of the defendants and the shipments of opioid medication, not rely on her to measure the harms, but to measure the shipments.

BY MR. KNAPP:

Q. Okay. Let's look at Appendix III.B quickly.

MR. SOBOL: Professor Cutler, is there any rhyme and reason for the numbering of these appendices? Are they intended simply to confuse, sir?

THE WITNESS: They make great sense to an economist.

BY MR. KNAPP:

Q. So Appendix III.B is your list of materials considered, right?

A. That is correct, Appendix III.B is the list of materials considered.

Q. Is it a complete list of the materials that you considered for your opinions in this case?

A. If you note the last line of Appendix III.B, it says "And all other documents cited in the report, the tables, or the appendices."

Q. So are all of the materials you

considered for your opinions in this case in your Appendix III.B cited in the report, in the tables, or the appendices?

A. Yes, that is correct.

Q. Any other materials beyond that you considered in formulating your opinions?

A. I read widely in areas of health economics, in areas of public economics as we were talking about, in areas of epidemiology, and in areas of healthcare, so I have read many studies associated with opioids, with illegal behavior, with crime, with mortality outcomes, so all of those go into my -- the knowledge base that I use to then build the model.

The Appendix III.B shows the very specific inputs that are used to justify the specific choices that I made here, but it's not a complete set of everything that goes into my thinking about how to build models, how to build a model in this specific case, how to think about causality and all the various other issues.

Q. So, Professor Cutler, I know -- I can already tell from having only known you for two

hours here you're a very precise guy, so I'm sure you understand that you were obligated to identify the materials that you considered in formulating your opinions, and you're obligated to include them on the list. So are there any other particular materials or documents that you considered in formulating your opinions here?

MR. SOBOL: Objection.

A. In terms of very specific substantive choices that were made in the model, this is the list. It may be possible that if you ask me why I approach something a certain way, I may say, oh, well, based on the literature that I know and am an expert in that guided me to think along these directions, but I didn't -- I did not -- I might not have specifically noted that because it would not have been relevant for the specific choice that was made here.

BY MR. KNAPP:

Q. All right. So you list two depositions in your list of materials considered, right?

A. That is correct, I do list two depositions.

Q. How did you figure out which depositions to look at?

A. I was guided in the depositions by counsel who indicated them as being of particular relevance for this.

Q. Did you ask for all of the depositions in this matter?

A. No, I did not ask for all of the depositions in this matter.

Q. Did you ask for all depositions that touched on the subjects of your report?

A. I don't remember the specific request, but it would have been something similar to that.

Q. Would you have wanted to review all of the depositions that touched on the subject matter of your report?

A. Yes, I would have wanted to review all the depositions that touched on the specific matters of this report.

Q. And do you think you did review all of the depositions that touched on the subject matter in your report?

A. Yes, I believe I did review the

depositions that touch on the specific subject matter.

Q. Okay. I think I know the answer, but did you read these depositions?

A. I read parts of these depositions. I'm not a lawyer, so there were vast parts that I couldn't make a lot of sense of.

MR. SOBOL: Oh, come on.

BY MR. KNAPP:

Q. That won't be the case for this transcript, I promise you.

Okay. All right. So then we've got Bates numbered documents listed right below that on Page 4.

Do you see that?

A. Yes, I do see that.

Q. And you list, I counted them, you list 16 documents that were produced in this litigation, is that right?

A. Yes, that is correct.

Q. Do you know how many documents have been produced in the litigation?

A. No, I don't know how many documents have been produced.

Q. Do you know if it's in the millions?

A. No, I don't know how many documents.

Q. How did you figure out which documents to look at?

A. Generally we looked for documents that would provide the data that we needed to construct the model. So if there was a particular issue that we needed, like, for example, the number of autopsies that were done and the number with a particular finding as to cause of death, then we would look through documents that indicated that. So it tended to be based on a specific need for data.

Q. Is it true with documents, like it is for depositions, that you would have wanted to see any of the documents that were produced that touched on the subject matter of your report?

A. Yes, that is correct, I would have wanted to see any documents related to the subject matter of the report.

Q. All right. If you turn to Page 6, there's data sources. Did you sign any protective orders to get access to any of this data?

A. The NCHS multiple cause of death data, it's not a protective order, but it's signed under a data use agreement, so one has to agree to the terms of the data use agreement in order to access those data.

Q. Did you sign any other data use agreements?

A. There is -- I believe there is a data use agreement for the IQVIA data. I -- there were terms under which it was acquired, and I don't know the specific wording to apply to that.

Q. Okay. I asked before about protective orders and we went to data use agreements, so I'm going to ask, did you sign any protective orders for any of the data that you accessed in connection with your assignment here?

MR. SOBOL: Objection to form.

A. I do not believe there were any protective orders on any of the data.

BY MR. KNAPP:

Q. You didn't conduct any interviews as part of your -- the preparation of your report?

A. I personally did not conduct any

interviews. There were members of the team who did conduct interviews.

Q. And where are those interviews listed in your report? Well, strike that.

Let me ask, did you rely on any of those interviews in connection with preparing your report?

A. Those interviews were conducted to determine the areas of activity that the counties undertake for which there might be harms, and to get from the counties their sense about what those harms were. That was then used to determine the specific areas that we wanted to model the harms in, and then the specific strategy that we might use in order to come up with an appropriate estimate of the harms that would result in those areas.

Q. Were those interviews conducted by Compass Lexecon?

A. There were a number of sources. Some of the interviews were conducted by Compass Lexecon, some were conducted -- I believe Professor McGuire conducted some, although I don't want to be 100 percent on that, but I

believe he did some. And then some were from -- were conducted with attorneys who then relayed the results of the discussions.

Q. Did you personally participate in any of those interviews?

A. No, I did not personally participate in any of the interviews.

Q. And -- strike that.

Do you know who any of the individuals were that were interviewed?

A. No, I don't know any of the specific individuals that were interviewed.

Q. Your understanding is that they helped -- well, let me ask -- strike that and let me ask this.

Did Professor McGuire identify the areas for which you analyzed harms, or did you independently come up with that list yourself?

MR. SOBOL: Objection.

Go ahead.

THE WITNESS: I'm sorry?

MR. SOBOL: Go ahead.

A. Professor McGuire was the one who came up with the areas. We then discussed them all

as a group.

BY MR. KNAPP:

Q. When you say you discussed them as a group, who was -- who participated in those discussions?

A. Professor Gruber, Professor Rosenthal, Professor McGuire, me, the team at Compass Lexecon, and the attorneys.

Q. Was Professor McCann involved in any of those discussions?

A. Professor McCann was not involved in those discussions.

Q. Why not?

MR. SOBOL: Objection to the form.

A. I don't -- I suppose mostly in the interest -- mostly in the interest of keeping the team at a workable level.

BY MR. KNAPP:

Q. Did you have any conversations with Professor McCann prior to issuing your report?

MR. SOBOL: That's a yes or a no.

A. No, I did not have any conversations with Professor McCann.

BY MR. KNAPP:

Q. So to the extent that the numbers in Table J.1 of your Appendix III.J come from Professor McCann, you don't know anything about the source or where those numbers came from?

MR. SOBOL: Objection.

A. That's correct, I do not know the source or where they came from. I was asked by counsel to demonstrate how one could use estimates of distributor misconduct to identify harm, and so that's what I did in that appendix.

BY MR. KNAPP:

Q. So prior to issuing your report, you didn't personally talk to anyone, any representatives of Summit County, is that correct?

A. That's correct, I did not personally talk to any representatives of Summit County.

Q. And you didn't talk to any residents of Summit County either, did you?

A. With respect to this litigation matter, no, I did not talk to any residents of Summit County.

Q. And you didn't talk to any representatives of Cuyahoga County prior to

issuing your report, right?

A. That's correct, I did not talk to any representatives of Cuyahoga County myself.

Q. And you didn't talk to any residents of Cuyahoga County prior to issuing your report, right?

A. With respect to this specific matter, I did not talk to any residents of Cuyahoga County.

Q. You might have talked to someone in Cleveland on a personal basis?

A. I have a number of students and some co-authors who are in the area and I like to talk to them about research and about life and so on, but not about this specific matter.

Q. Okay.

A. I'm sorry, I'm a very precise person, so --

Q. I appreciate that. I like precision. I try to be precise.

A. I just wish to answer precisely.

Q. No, I appreciate it.

MR. SOBOL: Here we are with the bromance.

BY MR. KNAPP:

Q. Okay. I'll try to be precise in my questions, but we'll see.

Did you look at anything else to prepare for your deposition today?

A. As a general matter of course, I read very widely about the opioid epidemic, as I have for quite a long period of time, and so that's always going on. But I'm not -- maybe if you give examples I might react to them, but I'm not thinking of anything specific that I would have done, read to prepare.

Q. Well, let me ask you this. How much time did you spend preparing for your deposition today?

A. I would guess I spent probably ten hours.

Q. And was that ten hours in the last week?

A. The ten hours would have been in the last maybe three weeks.

Q. And explain to me what you did during those ten hours. It was --

MR. SOBOL: Just the topics, not the

content of the conversations.

A. So it was a mix. I reviewed the details of all of the estimation, and then I also practiced answering questions about the materials.

BY MR. KNAPP:

Q. When you say you "practiced answering questions," did you do some sort of media training?

MR. SOBOL: Objection. I instruct him not to answer.

BY MR. KNAPP:

Q. What do you mean when you say you practiced questions? What do you mean by that?

MR. SOBOL: Objection. I instruct him not to answer.

BY MR. KNAPP:

Q. I'm not asking for the content of the questions that you considered. I'm asking you just what you mean by you practiced questions and answers. What does that mean?

MR. SOBOL: Objection. I instruct him not to answer.

MR. KNAPP: What's the basis for the

objection? Because I'm not asking about the content.

MR. SOBOL: It was with counsel.

BY MR. KNAPP:

Q. Did counsel participate in all of the sessions that you participated in where you practiced answering questions and answers?

A. Yes, counsel participated in all of the sessions.

Q. And were you instructed to look at the camera when you're answering questions?

MR. SOBOL: Objection. I instruct him not to answer.

BY MR. KNAPP:

Q. Let's look at page -- would you turn to Page 12 of your report -- I'm sorry, Paragraph 12. It's on Page 6. Do you see it says "In preparing this report, I and staff under my direction analyzed data, reviewed economic literature, court filings, documents produced in this litigation, and deposition testimony"?

Do you see that?

A. Yes, I do see that.

Q. Did you personally review all of the materials that were cited in your list of reliance materials?

MR. SOBOL: Materials considered.

MR. KNAPP: Materials considered, thank you. Lack of precision there.

A. I and others reviewed everything here. I believe I looked at everything that's cited, yes.

BY MR. KNAPP:

Q. There's nothing in particular that you could point to where you would say, well, that was somebody on my staff, but I didn't personally look at it?

A. The only thing I'm wondering about is the very specific documents that might have data in them that might be, for example, a single page of data. There may have been some of those that I personally did not review that would have been looked at and transcribed into the appropriate software by a member of, in this case, Compass Lexecon, so I cannot say for sure every single bit of data that I looked at. But other than that, I looked at everything else.

Q. So in Paragraph 12 when you refer to your staff, are you referring to the folks that we talked about from Compass Lexecon?

A. Yes, I'm referring to the Compass Lexecon team.

Q. Okay. If we go back to Paragraph 10, Paragraph 10 describes your assignment in this report, correct?

A. That's correct, yes.

Q. Was the assignment defined by counsel?

A. Yes, the assignment was defined by counsel.

Q. And in Paragraph 10.3 there's a reference to defendants. What does that mean in the context of your report?

A. The part of Paragraph 3 which says "What is the percentage of harm attributable to prescription opioid shipments for which defendants are responsible," what that is referring to is taking the estimates from Professor Rosenthal of the shipments for which defendants are responsible, which are due to -- excuse me, which are due to misconduct on the part of the defendants, and then using those to

estimate the harms that result from that misconduct.

Q. Right. And I guess what I'm asking about is when you refer to defendants in this report, unless it's followed -- or preceded by manufacturer, distributor, or pharmacy, are you referring to all of the defendants in the litigation?

A. I didn't understand your earlier question. My apologies.

Yes, I'm referring to all of the defendants in this litigation.

Q. Okay. And did you conduct any analyses of which manufacturers manufactured which types of opioids?

A. For this report I did not take into account any of that. I did not use that in making the estimates here.

Q. And did you conduct any analysis of which distributor shipped which types of opioid medicines?

A. No. And the purpose of this report, I did not build that into the model that I constructed in any way.

Q. Okay. Then if we go up to Paragraph 10.2, you refer to calculating harms from 2006 to 2018. How did you pick that time period?

A. That time period was given to us by counsel.

Q. And when you say "us," who are you referring to?

A. Us being myself, Professor Gruber, Professor Rosenthal, Professor McGuire, and of course the teams that were supporting us as we did our reports.

Q. Okay. All right. Then if we move to Paragraph 11, 11.2 -- well, first, Paragraph 11 summarizes your conclusions, right?

A. Yes, that is correct.

Q. And Paragraph 11.2 refers to the percentage of harms that can be economically estimated.

Do you see that?

A. Yes, I do see that.

Q. What's -- from an economic perspective, what's the difference between an estimate and a calculation?

A. I don't make a distinction between an estimate and a calculation. Typically -- so I'm not trying to be precise in that. Typically a calculation is something for which the answer is exact, and an estimation is something for which one had to -- I hate to use the word again -- one had to estimate, so there's some uncertainty, more than just a calculation. But that's not a hard-and-fast distinction for which the economic literature is extremely clear.

Q. And so in connection with your report, when you refer to "estimates" you're referring to numbers that don't have an exact calculation, is that right?

A. Generally, yes. If I estimated something, it typically implies that it's my best informed estimate, but it's not an exact -- it may not be an exact calculation.

Q. Is there a particular percentage of confidence that you need for an estimate to become a calculation?

A. Oftentimes when we refer to estimates we typically refer to them as the outcome of an estimation methodology, like, for example, one

would use the word estimate as a regression, "based on a regression I estimated the following." So that's a very common economic terminology.

And so I'm following that here by, in essence, saying, yes, as a result of the model that I developed which, amongst other things, uses regression analysis, that this can be estimated. So that's the specific context here.

Q. Now, I noticed in the reports of Professor Gruber and Professor Rosenthal they refer to offering their opinions based upon a reasonable degree of certainty in the field of economics. Did you see that language in their reports?

A. I don't recall it specifically. I would have to look through their reports to verify it exactly.

Q. You don't use the language of reasonable certainty -- let me get it, make sure I've got it. Strike that.

You don't use the language that your opinions are based upon a reasonable degree of certainty in the field of economics, is that

right?

MR. SOBOL: Objection.

A. That's correct, I don't use that specific language.

BY MR. KNAPP:

Q. Is there any particular reason why you didn't use that language?

MR. SOBOL: Objection.

A. No, there's no specific reason why I didn't -- I didn't use that language.

BY MR. KNAPP:

Q. Were you asked to offer opinions based upon a reasonable degree of certainty?

A. I understood my task as to offer opinions upon a reasonable degree of certainty.

Q. And do you have a reasonable degree of certainty in each of the opinions that you offered in your report?

A. Yes, I do have a reasonable degree of certainty about the opinions that I offer in the report.

Q. And does that also include the calculation based upon the numbers that are in Table J.1 where you weren't able to confirm the

accuracy or reasonability of the numbers?

MR. SOBOL: Objection. Scope.

A. As noted in Appendix J.1, those numbers were provided to me by counsel, so I'm not making a determination as to those numbers. I'm using them to demonstrate how the methodology can be used. The numbers that I developed in my report are the ones for which I have a reasonable degree of certainty.

BY MR. KNAPP:

Q. But in your report you produce numbers that are the result of a calculation that includes the percentages in Table J.1, right?

A. That's correct. In the Appendix J, I then show the impact of those percentages on the harms that would result.

Q. So my question is, are you offering those calculations -- strike that.

Do you have a reasonable degree of economic certainty in the results of those calculations that rely on the inputs from Table J.1?

A. I have a reasonable degree of certainty that given the inputs as specified in

Appendix J.1, the outputs that I give, which are the harms that result from that, that those are the -- with a reasonable degree of certainty those are the harms that result from that level of misconduct.

Q. Did you consider whether there's an error rate for any of the estimates that you provided in your report?

A. Can you rephrase the question, please?

Q. Did you consider whether there was a margin for error, or error rate, associated with any of the estimates that are included in your report?

A. Yes, there are error rates associated with any estimation.

Q. And do you have -- well, strike that.

What are the error rates associated with the calculations that you include in your report? Do they vary by calculation?

A. Yes. The errors vary by calculation.

Q. And you didn't include the error rates in your report itself, did you?

MR. SOBOL: Objection.

A. What I'm -- the term error rate is not

an economic term, so I want to -- if you would help me define what you mean by error rate, then I can answer the question better.

BY MR. KNAPP:

Q. Were you more comfortable with the term margin for error?

MR. SOBOL: Objection.

A. That's not a particular term that gets applied to an economic estimate.

BY MR. KNAPP:

Q. Well, let me ask you this. The question I asked you was, did you consider whether there was a margin for error or error rate associated with any of the estimates that are included in your report, and you answered yes, there are error rates associated with any estimation. What did you have in mind when you answered that question?

A. Any estimation involves standard errors, and so I did consider the standard errors that are associated with the model that I developed.

Q. And you didn't -- did you outline or include any of the standard errors associated

with any of your calculations, from the calculations in step 1 to step 3, in your report?

A. Yes, I do include the standard errors in several parts of the report.

Q. Is there any standard errors included in the calculations associated with step 1 of your report that are actually included in your report?

A. Can I just make sure I understand exactly what you mean by step 1 of my report?

Q. So step 1 is your estimate of --

A. I just want to make sure that I'm answering exactly the question you wish.

Q. So I consider step 1, and I guess in Paragraph 24 you refer to it as your first step.

A. Got it.

Q. But it's your calculation or your estimation of the share of harms attributable to opioids. Are we on the same page there?

A. Yes, I am -- I am here.

Q. Did you include any standard errors associated with these estimations in your report?

A. This -- so what this is largely referring to is, for example, what share of each department's activity was a result of opioid use. There we present -- I present the means but not the standard errors of those estimates.

Q. And do you know, sitting here today, what the standard errors are for those estimates?

A. No, I don't know them offhand, no.

Q. Did you calculate them?

A. No. Some of them can be easily calculated. Things that are probabilities will have straightforward standard errors. But no, I did not calculate them.

Q. Did anybody working under your direction calculate the standard errors associated with your estimations of the share of harms attributable to opioids?

A. No, I don't believe we did, no.

Q. Okay. Let's turn, then, back to Paragraph 11.1. So in 11.1 you refer to the increase in prescription opioid shipments. Is what you're referring to there shipments from distributors to pharmacies of prescription

opioid medicines?

A. I'm not sure if you're trying to make a distinction between that and something else.

Q. Well, you're not referring to shipments from a manufacturer to a distributor, are you?

MR. SOBOL: Objection.

BY MR. KNAPP:

Q. Or do you know?

MR. SOBOL: Objection.

A. What I'm looking at is the relationship between the opioid shipments to a particular area and the harms. I'm not making any statement about the causal chain that got the drugs to the area. So I'm picking up when the drugs are at the area.

BY MR. KNAPP:

Q. Right.

But you looked at particular data on shipments, right?

A. We looked at the shipments, the sum of all the shipments that got to the area.

Q. And so my question is, are those shipments from manufacturers to distributors,

distributors to pharmacies, pharmacies to patients? What shipments are you looking at?

MR. SOBOL: Objection. Asked and answered.

A. We're looking at -- so we're looking at all the shipments that go to the dispensers in the area. So the ARCOS data which have the data on shipments indicate all the categories through which drugs are shipped for retail consumption to different areas, in this case three-digit ZIP codes, and so that's -- those are the data that I'm referring to in this paragraph.

BY MR. KNAPP:

Q. And so the ARCOS data includes shipments of medicines that are made by companies that are not defendants in this litigation, right?

A. I believe that's correct, yes.

Q. And so your model finds that non-defendants' shipments are correlated with increases in mortality, is that right?

MR. SOBOL: Objection.

A. I don't look at the shipments of any

particular set of companies, either defendants or not defendants. What I do in the model is I relate the shipments to the harms, and then I take as an input to evaluate what share of shipments are a result of misconduct on the part of the defendants. That number then is an input, and gives a harm associated with the misconduct on the part of the defendants.

BY MR. KNAPP:

Q. So do you know one way or another whether the shipments that you find are correlated with increases in mortality include shipments of products that were manufactured or distributed by non-defendants?

MR. SOBOL: Objection.

A. All shipments in the ARCOS data with the exception of buprenorphine and Methadone are included in the analysis here. So that would include any company that -- from which there were shipments of opioids other than those two.

BY MR. KNAPP:

Q. And I want to make sure we're being precise when we refer to Methadone and buprenorphine. When you say that they were

excluded, they were excluded from the shipments, but they were not excluded from the mortality data, correct?

A. That is correct. We excluded them from the shipments. We have all deaths in the mortality data.

Q. Why did you decide that it was reasonable to include deaths from Methadone and buprenorphine if you did not include shipments of those medicines in your regression?

MR. SOBOL: Objection to form.

But go ahead.

A. Partly it's very difficult to separate out the mortality data by specific drugs, so we do an estimate for, for example, opioids, but not by the specific opioid. It's not actually reported that way. So we wouldn't be able to do it even if there was a desire to. But, also, the exclusion -- so that's part one.

Part two is the exclusion of those drugs, is because most of those -- not most, a lot of those medications are used for treating addiction rather than for treating pain, and so it wouldn't be appropriate to include on the

right-hand side. It would be biased to include on the right-hand side something which is used to treat addiction rather than treating pain.

BY MR. KNAPP:

Q. Now, when you said it's very difficult to separate out the mortality data by specific drug, are you referring to drugs generally, or opioids specifically there?

A. There are many issues with the mortality data. Sometimes the data list drug overdose, but they don't indicate any particular type of drug. And then sometimes they will indicate, for example, opioids, but not give a specific type of opioid, whether it's a synthetic opioid or heroin or semisynthetic opioid. And I don't believe they ever give the specific drug that's used. I would want to look in the data appendix to be absolutely certain of that, but I don't think they have the specific drug that's used.

Q. That would be the case not just for opioids, but all other classes of drugs as well?

A. There's some delineation that the death certificates have in terms of the nature

of the drugs that they include. Generally as you want more and more detail, the data are less complete.

Q. What are some of the other issues -- strike that.

You mention that there are many issues with mortality data. What are the other issues that you had in mind?

A. You asked a specific question about the use of mortality data as related -- even that might include deaths due to abuse of other drugs that are not included in the ARCOS, so those are the specific reasons why those -- why one would want to exclude -- why one cannot exclude death due solely to those drugs that are excluded from the shipments variable.

Q. When you said there are many issues with the mortality data, what else did you have in mind? Well, strike that.

Did you identify any other issues with the mortality data in terms of trying to identify the cause of death associated with any particular incident?

A. As we discuss in the data appendix,

the primary issue is the one that we were talking about, which is the fact that not all causes are identified on each death certificate, and so we followed the methodology of Professor Christopher Ruhm in order to adjust for that.

In addition, there's an issue about the fact that their cause of death codes are coded in ICD-9 prior to 1999 and ICD-10 after 1999, and those codings do not always give the same share of deaths, the same number of deaths due to each cause. So we used comparability ratios for cause of death between ICD-10 and ICD-9 to adjust to a consistent standard over time.

Q. Bear with me just one second here.

MR. SOBOL: Take all the time you'd like.

BY MR. KNAPP:

Q. All right. So just kind of sticking with the topic of the mortality data, what your regression model does is it models the relationship between opioid-related mortality and prescription opioid shipments, right?

A. To be precise, that's one of the

models that we use, so that's the direct model that we use. There's another set of models, the indirect model, which is a different way of approaching the problem of the harm that results from opioid shipments. That does not model specifically the relationship between deaths and shipments of medications.

Q. For both models you're looking at both deaths from licit as well as illicit opioids, right?

A. Sometimes we break them out, and sometimes they're included together, that's correct.

Q. And actually let's turn to Paragraph 94 of your report. So Paragraph 94 is talking about your indirect model for illicit mortality post 2010, right?

A. Yes, that is correct.

Q. And in Paragraph 94, five lines down there's a sentence that says "The death rate due to use of illicit opioids is defined to include any death involving heroin and/or fentanyl."

Do you see that?

A. Yes, I do see that.

Q. Did you use that definition for deaths related to illicit opioids for both your direct and your indirect models?

A. The direct model uses any opioid death as the dependent variable. It does not make a distinction between deaths due to use of licit opioids and deaths due to use of illicit opioids.

Q. But to identify in your direct model, the deaths due to the use of -- strike that.

In your direct model, did you include deaths that involve heroin and fentanyl?

A. Yes, the direct model has as the dependent variable any death due to opioids.

Q. So I guess what I'm getting at is, what does this mean? You used the term "involving heroin and/or fentanyl." What does that mean, "involving"?

A. So when we say any death involving heroin and/or fentanyl, some people have multiple drugs listed as a cause of death, so a particular death might have use of both -- might have a report of use of a licit opioid as well as an illicit opioid. This sentence is

referring -- excuse me, this sentence is referring to how we divide deaths into those involving licit opioids and those involving illicit opioids. And what it's saying is that any death where there was any involvement of heroin and/or fentanyl, so any death involving use of an illicit opioid, was included in our definition of deaths due to illicit opioids, independent of whether there was also any mention of a licit opioid.

Q. Do you use the word "involving" here to mean caused?

A. Cause implies something very specific. So the -- in the case of -- for example, a death with multiple drugs listed, the coroner or the medical examiner will generally write down "these were the drugs that were in the person's system," but they don't make a distinction as to which of the drugs, for example, was it a licit drug or an illicit drug was the cause. There will be an overall cause, which is drug poisoning, but there will not be -- there may be multiple causes listed. So this is saying what do we do when there are multiple causes listed.

Q. And so for purposes of your regression models, if a medical examiner report lists opioid and opioid along with several other drugs, you included it as an opioid-related death, right?

A. That's correct. If there was a death that involved opioids and other drugs, it was included as an opioid-related death.

Q. And there's no way to tell from the medical examiner data whether the opioid was actually the cause of death, right? It could have been one of the other drugs?

MR. SOBOL: Objection.

A. That's correct, there's no way to tell. The medical examiner in those cases does not make a determination as to which specific drug was the cause, even to the extent one could do that.

BY MR. KNAPP:

Q. But in your model and in your report, you assume that the opioid was the cause of the death, right?

A. No. We're actually not making the assumption that the opioid is the cause of the

death. We're including it in opioid-related deaths, but we don't have to make an assumption that the opioid was the cause here.

Q. So even if somebody overdosed on cocaine, you would say -- well, strike that.

If a person overdosed on cocaine but there was some heroin in their system, but the heroin wasn't the cause of death, you would include that in your opioid-related deaths, right?

MR. SOBOL: Objection.

A. That's correct. It would be counted in the opioid-related deaths.

BY MR. KNAPP:

Q. Even though the opioid did not cause the death?

MR. SOBOL: Objection.

A. I'm not -- there's a hypothetical there that I'm not -- that I don't know how to answer. So you're sort of positing that the one caused the death over the other. What I'm doing is just using the data to say that there was a presence of illicit opioids in that person when he or she died.

BY MR. KNAPP:

Q. So you're not making -- with respect to any of the mortality data, you're not making any causal assumptions or conclusions about what caused those deaths?

A. I'm only using what the medical examiner gives as the cause.

To the extent that the medical examiner gives multiple deaths -- multiple drugs, one an opioid and one a non-opioid, I'm not making an assumption, I'm including them in the estimate here, but I'm not -- but it doesn't have to be the case that all of those would have resulted from the opioid death.

Q. What --

A. From the opioid. Excuse me.

Q. What percentage of deaths in the mortality data you looked at had multiple drugs listed in the cause of death?

A. I don't know the answer to that offhand.

Q. Do you have an estimate?

A. No, I don't have an estimate. It will certainly vary over time. It would have been

smaller earlier in the time period than later, but I don't have an estimate.

Q. Do you know if at any time period it was more than 20 percent?

A. No, I don't. I don't have an estimate.

Q. Now, you would agree that the pharmaceutical manufacturers that are defendants in this lawsuit, they manufacture different types of opioids, right? We talked about that before, right?

A. That is correct, there are different active ingredients in the opioids.

Q. There's also differences in strengths that are sold?

A. That is correct, there are differences in strengths.

Q. Differences in dosing intervals?

A. That's correct, there are also differences in dosing intervals.

Q. And differences in indication?

A. That's correct, there are differences in indication.

Q. And differences in potential for

abuse?

MR. SOBOL: Objection.

A. I don't -- I don't want to testify as to potential for abuse because that's a medical statement, and I'm not qualified to give a medical opinion.

BY MR. KNAPP:

Q. Well, let's try to speak in numbers then.

Do different opioids have different actual rates of abuse?

A. I don't know of the latest data on that, so I don't want to say yes or no.

Q. Do you know of any data on the actual rates of abuse of different opioids?

A. No, I don't offhand know of any data.

Q. How do you account for the differences in the rates of abuse of different opioids in your model, if at all?

MR. SOBOL: Objection.

A. What the model does is it relates the shipments of opioids to the harms that result. Implicitly what the model is giving is an average, that is, on average when there's a

certain amount of shipments, what is the impact on harms. That average will average over some drugs which may be more abused than other drugs, and some drugs which may be less abused than other drugs. So that's one -- so the model is sort of giving an average of those. I did not build the model to look at each specific type of molecule or specific type of drug.

BY MR. KNAPP:

Q. You would agree that some types of opioids contributed to the harms that you analyzed more than others, right?

MR. SOBOL: Objection. Asked and answered.

A. Certain drugs were shipped for more than others, so certainly one difference between different types of drugs is that the harms that I document are related to the amount shipped, and that would be one obvious difference across different drugs would be how much they were shipped.

BY MR. KNAPP:

Q. Well, I understand that you've got, you know, sort of a weighting for the volume of

shipments of each different type of opioid. Setting aside that, do you acknowledge -- strike that.

So setting aside the weighting that's done by nature of including the volume of each different type of prescription, do you agree that certain types or classes of opioids contributed to the harms you analyzed in your model more than others given that you used an average?

MR. SOBOL: Objection to the form.

You can answer.

A. I can't say for sure whether, from my model, whether some contributed more than others, so I have no way to tell that from the model. And I'm not a medical expert to say whether any one particular drug would be more associated with, for example, addiction or anything else harmful than another type of drug.

BY MR. KNAPP:

Q. All right. Let's look at Table 3.9 on Page 62. And I want to look in column F, and if we look at the number for 2014. I just want to make sure I understand what this model is, what

this table is showing.

Is it your opinion that half of all opioid prescriptions -- strike that.

Is it your opinion that half of all opioid shipments in 2016 were medically unnecessary?

MR. SOBOL: Objection.

A. I'm not making a statement about medical necessity or not. This is a -- this is a statement about the shipments attributable to misconduct on the part of the defendants.

BY MR. KNAPP:

Q. So you don't have an assessment one way or another of whether any of these shipments that fall within the 50 percent were actually medically necessary for someone in Summit County or Cuyahoga County?

MR. SOBOL: Objection. Asked and answered.

A. I don't make an assessment in this report about medical necessity.

BY MR. KNAPP:

Q. Well, you're attempting to analyze the net harms associated with these shipments,

correct?

A. That's correct, I am estimating the net harms from the shipments.

Q. And if these medicines and these prescriptions, 50 percent of prescriptions were medically necessary for someone in Cuyahoga County, you would have to offset the benefits from those prescriptions against the harms, wouldn't you?

MR. SOBOL: Objection.

A. A different type of analysis is to do a cost effectiveness analysis associated with any technological innovation that has both benefits and costs. So I interpret your question as being if you were going to do a cost-benefit analysis of this particular class of medications, would you want to look at the benefits in addition to the costs? The answer to that is absolutely yes, if one wanted to do a cost effectiveness analysis.

In this case I'm not doing a cost effectiveness analysis. Instead I'm looking at the harms, and that's a very different type of analysis than a cost-benefit analysis.

BY MR. KNAPP:

Q. So, Professor Cutler, you testified earlier that you're looking at the net harms associated with these shipments, right?

A. That's correct, yes.

Q. Doesn't net harms mean harms net of the benefits associated with these shipments?

A. No, that's not what I mean by net harms. By net harms I mean the net to the government, that is the net to each of the agencies. So I was not using net in the framework of a cost-benefit analysis.

Q. So would you agree that to the extent that any of these 50 percent of prescriptions in 2014 provided benefits to residents of Cuyahoga and Summit County that your model overstates the net harm associated with these shipments?

MR. SOBOL: Objection. Scope, form.

A. No, that's not correct actually, because what the model does is it relates the total shipments to the harms, so it's saying -- it could have been the case for some particular medications, one could build a model and they would show that increased shipment of a

medication for something, a completely different condition, is associated with fewer arrests and fewer cases of child custody and less crime and fewer deaths and medical examiner affects and so on. So any -- so what this is giving is through all the channels, both positive and negative, what is the impact of shipments of opioid on -- shipments of opioids on those harms.

And so if there -- if it were a favorable impact, the model would have said increased shipments are associated with benefits. The fact that it doesn't is a sign that all things taken into account, it's not associated with benefits, it's associated with harms.

BY MR. KNAPP:

Q. What benefits -- strike that.

Your regression model looks at mortality, right?

A. That particular regression model. I also -- of course, at the end there are regressions for crime. But the ones we've been talking about are the models for mortality.

Q. Where in your regression model do you

account for the benefits that the county might receive from medically necessary prescriptions of opioid medicines?

MR. SOBOL: Objection. Scope, form.

A. I think you're asking me a hypothetical, so let me give you a hypothetical answer.

If it had been the case that treating people's pain improved their quality of life to a degree sufficient that their mortality fell, and that, therefore, they lived longer and so on and so forth, that would -- and there was no crime and no child welfare issues and so on, that would show up in the models, in the mortality models it would show up as a reduction in deaths associated with increased shipments. Nothing in this requires that the increased shipments be associated with increased -- with increased deaths. There's absolutely nothing here that says that that has to happen.

Similarly, in the crime models that we use as confirmation, if increased shipment of opioids reduces crime by, for example, allowing people to be at work longer, be more productive

at work, earn more, less need to resort to crime and so on, those models would also have shown that an increase in shipment leads to lower crime. There's absolutely nothing in the analysis that prejudges that these will find harmful effects of opioid shipments as opposed to favorable effects of opioid shipments.

Q. Now, with respect to the regression, the direct and indirect regression you did on mortality, your model would only account for the benefits of opioids to the extent it had an impact on mortality, right?

MR. SOBOL: Objection.

A. In those -- in those specific models, the dependent variable is mortality, so that any impact that was favorable would be captured only to the extent that it influenced mortality.

BY MR. KNAPP:

Q. So if there were benefits to these counties that didn't impact mortality, your direct and indirect mortality regressions would not pick up those benefits, right?

MR. SOBOL: Objection. Scope.

A. That's one of the reasons why we were

particularly interested in doing the crime models that are in the appendix -- or excuse me, not in the appendix, that are in the last section of the report, because we wanted to see if we could confirm the methodology that we had directly using crime data, so we didn't have to go through the mortality component. And the results of those models were that the impact on crime, using crime as the dependent variable, crime is the variable that we're explaining, actually suggested a bigger impact on crime than the results using the mortality data, so that lends confirmation to what we were finding there.

BY MR. KNAPP:

Q. So I asked a pretty direct question. I'm going to ask it again.

If there were benefits to these counties that did not impact mortality, your direct and indirect mortality regressions would not account for those benefits, is that right?

MR. SOBOL: Objection. Asked and answered, scope.

A. The mortality regressions would not

pick up anything that's not mortality. The crime regressions would. And, yes, so I'll leave it there.

BY MR. KNAPP:

Q. And you didn't run any regressions for any other categories of harms that you looked at other than mortality and crime, right?

A. That's correct. We didn't run any other regressions.

Q. So you didn't run a regression on juvenile removals?

A. The data on juvenile removals are not -- they're --

Q. Sir, just -- my question was, did you or didn't you. I don't need to know what the explanation is. The question is, did you run it?

A. My apologies, I'm being a professor.

Q. But it's just -- honestly it's just a yes or no question.

MR. SOBOL: No, no, no, you can't tell him how he's going to answer. He's going to answer -- testify truthfully as best he can.

BY MR. KNAPP:

Q. So my question is did you run it, not why didn't you run it. I may ask you why you didn't. But my question is, did you run it?

MR. SOBOL: Now we're getting a little testy. You can answer the question however you think best to answer it truthfully.

A. In my report I don't rely on anything about that at all.

BY MR. KNAPP:

Q. Okay. You also didn't run a regression on the relationship between shipments and children and family services, did you?

A. In the report I don't rely on anything about that.

Q. You didn't run a regression on the relationship between shipments and addiction and mental health activity in Summit or Cuyahoga County?

A. In the report I don't rely on any of that.

Q. Well, did you -- when you say you didn't rely on it in your report, did you run regression analyses on any of these other categories of harm that you didn't include in

your report?

MR. SOBOL: Objection.

A. I'm not relying on anything other than what's here.

BY MR. KNAPP:

Q. That wasn't my question.

My question is, did you run the analyses?

MR. SOBOL: Objection. Asked and answered.

When the witness said "here," he pointed to his report.

A. In the report I'm not relying on anything other than the analysis here.

BY MR. KNAPP:

Q. Professor Cutler, my question was, did you look at and did you run regression analyses on any of these other categories of harm that you didn't include in your report?

MR. SOBOL: Objection. Asked and answered three times now.

A. The report doesn't -- I'm not relying on anything except what's here.

BY MR. KNAPP:

Q. Do you not understand my question? My question is not about what's in your report. I can read your report, I know what's in there.

My question is, did you run any other regression analyses and look at them related to any of these other categories of harm?

MR. SOBOL: Objection. Asked and answered.

You've answered it enough times now.

BY MR. KNAPP:

Q. I'm waiting for an answer to my question.

MR. SOBOL: I've instructed him not to answer. You've already asked four times.

MR. KNAPP: What is the basis for instructing him not to answer? He said it's not in his report. He didn't say whether he looked at it.

Counsel?

MR. SOBOL: Yes.

MR. KNAPP: What's the basis for the objection?

MR. SOBOL: I just told you a minute ago, it was less than a minute ago.

MR. KNAPP: Your position is that because he says it's not in his report he doesn't have to answer if he -- this is analysis that he looked at.

MR. SOBOL: No, my position is that you asked him the question three or four times. Professor Cutler very carefully gave you the answer that he thinks is truthful testimony. You didn't like it, so you asked it again. He gave you the same answer that he thought was truthful testimony. You asked it again. A third time, he gave you what he thought was the truthful testimony. Now you've asked it a fourth time, and I've instructed him not to answer. Now, if you'd like to spend your time like this, fine.

MR. KNAPP: All right. Well, I'm just going to state for the record that the witness is refusing to answer whether he ran regression analyses that weren't included in his report.

MR. SOBOL: You can say whatever you want to say.

MR. KNAPP: Okay.

MR. SOBOL: What I'm telling you is if

you'd like to spend the time, you can ask him the question again.

I now will withdraw my instruction. I have a hunch that Professor Rosenthal [sic], being the precise person that he is, will give you the exact same answer again, so spend your time however you'd like.

BY MR. KNAPP:

Q. Okay. Professor Cutler, whether or not you included it in your report, did you run a regression on any of the other categories of harm that are referenced in your report?

MR. SOBOL: Objection to the form. Asked and answered.

A. I'm -- in my report what I want to focus on is the conclusions I give in my report, which are what's noted here.

MR. KNAPP: Okay. I'm just noting for the record that the witness is refusing to answer my question about analyses that he did and may have considered in connection with reaching conclusions in this report, and I'm going to reserve the right to open up the deposition to ask further questions about these,

to request the regressions that this witness may or may not have seen, because he's refusing to answer my question.

MR. KO: Let me just note for the record also that pursuant to the CMO, and in particular Paragraph 10B, all drafts are off limits. So to the extent you're asking him about regressions that are not in the report, not discoverable, completely outside, Mr. Cutler has responded to your questions.

MR. KNAPP: Okay. And my rights are reserved on that.

BY MR. KNAPP:

Q. In connection with your models, did you consider whether -- well, strike that.

Let's go back to Table 3.9, and we're dealing with -- we were looking at the percentage in column F for 2014, which is 50.6. And that's the cumulative percent of shipments that you identify as attributable to defendants' misconduct, right?

A. The weighted average cumulative percentage of shipments attributable to defendants' misconduct.

Q. Did you consider whether if fully 50 percent of the prescription opioids referenced in your model were removed from Summit or Cuyahoga County, whether that would leave legitimate pain untreated?

MR. SOBOL: Objection to form.

A. No, I made no determination as to what would happen to any individual who was -- let me just -- I'm just -- rather than giving a long answer. No, there's no determination here as to what this would mean for any specific individual.

BY MR. KNAPP:

Q. And there's no determination for what the impact on Cuyahoga or Summit might be if removing 50 percent of the prescriptions from the population left legitimate pain untreated?

MR. SOBOL: Objection to the form.

A. You're asking about a hypothetical, which is if one removed the opioids from Summit or Cuyahoga County. That's -- so, A, I did not look at the impact for any specific individual. But B, also that hypothetical doesn't -- is not what these data are, because what this is

showing is how was the increase in shipments associated with harms.

You're then asking a hypothetical, suppose you take those away. In thinking about that hypothetical, I think there are many more things one needs to think about than just what this calculation gives.

BY MR. KNAPP:

Q. Well, in connection with your model, you're calculating how many deaths there would be -- would have been but for the existence of these opioid shipments in the world, right?

A. That's correct, yes.

Q. So my question to you, sir, is, in this but-for world, did you consider whether there would be other costs to these counties associated with removing these prescriptions from the world?

MR. SOBOL: Objection. Scope, form.

A. What the but for is here -- I want to be very, very precise. What the but for is here is what was the impact of shipments on mortality relative to what mortality would have been had there been no misconduct on the part of the

defendants. So it's about the shipments due to misconduct.

You're then asking a different question, which is suppose I then take that and I say, what if I remove opioids. That's actually a -- not the same calculation as what happened when opioids came in because, as we know, when you then remove the opioids, additional things can happen like, for example, people use illicit opioids. So that hypothetical in terms of, okay, suppose I now remove the opioids does not follow directly as the converse of what was the impact of the increase in the number of opioids.

What this model does is it tells what is the impact of the increase in the number of opioids. As written, I would -- you then need to think about how to extend that to a situation where you then remove opioids.

I hope that was clear. I'm trying my very best to answer your question.

Q. All right. Let's look at Paragraph 18. Do you see in Paragraph 18 -- one, two, three, four, five -- six lines down

you say, "For the purposes of my analysis, I assumed defendants' misconduct directly influences sales and shipments of prescription opioids as presented in the Rosenthal report."

Do you see that?

A. Yes, I do see that.

Q. And you don't intend to offer any opinions on whether there's anything inherently unlawful about promotion of prescription medicines, do you?

A. I'm not making any statements about general promotion of pharmaceuticals.

Q. And you don't have any opinions -- you don't offer any opinions on whether promotion in general has a positive or negative impact from an economic perspective?

A. That's correct, I'm not making any determination as to whether any -- I'm not offering any opinion as to whether promotion of pharmaceuticals in general is a good or a bad idea.

Q. Now, to your knowledge, does Professor Rosenthal opine that all promotion of opioids by the manufacturer defendants from 1995 to the

present was unlawful?

MR. SOBOL: Objection. Form.

A. Professor Rosenthal uses -- she has estimates of what share of the promotion was misconduct. And I'm trying to remember if I -- I'm trying to remember that specific part of her report, and I would want to review her report before I answered that question specifically.

BY MR. KNAPP:

Q. Well, let's assume that Professor Rosenthal is opining that all promotion by the manufacturer defendants of prescription opioids from 1995 to the present was unlawful, and that's at least an assumption that's built into her model, do you agree that that's a reasonable assumption?

MR. SOBOL: Objection. Form, mischaracterizes the report.

A. I'm not -- it's not my opinion. I don't make an opinion about the reasonableness of that assumption.

BY MR. KNAPP:

Q. Well, aren't the assumptions that are baked into Dr. Rosenthal's opinion baked into

your model because you rely on the output of her report?

A. I rely on the output of Professor Rosenthal's report. If she were to conclude that there was a different percentage of shipments which were due to misconduct, I could take those estimates and then use those to estimate the share of -- estimate the harms that result from opioids.

So it's not baked into the model. The model takes that as an input. If she or the court determined that that -- the true number was different or the court decided that it wanted to look at some harms and not other harms, or harms from some defendants and not other defendants, that's something that she could output from her model that I could then take and say, okay, therefore, what were the harms associated with that.

Q. Do you believe it's a reasonable assumption that all promotion by manufacturing defendants of opioids -- strike that.

Do you believe it's a reasonable assumption that all promotion of opioids by

manufacturing defendants from 1995 to the present was unlawful?

MR. SOBOL: Objection. Scope.

A. It's not -- that's not a subject that I've examined here, so I don't have an opinion on it.

BY MR. KNAPP:

Q. You haven't examined any of the marketing materials that were used by the manufacturing defendants in this case?

A. I have not examined any of the marketing materials used by the defendants, employed -- employed by -- I'm trying to remember the word used exactly, employed by or used by the defendants.

Q. I'm trying to understand -- since you are relying on Dr. Rosenthal's output, right?

A. Mm-hmm.

Q. -- do you know one way or another, sitting here today, whether she assumed that all marketing of prescription opioids by the manufacturing defendants was unlawful?

A. I would just want to check her report to be very precise to give you a precise answer.

Q. So you don't know one way or another as you sit here?

A. Again, I don't want to give you a -- I don't want to say something incorrect, so I'd rather review her report and give you a precise answer.

Q. That's a clever way to say no.

A. I'm not trying to say no. I'm trying -- my job as a professor is to teach students and be as accurate as possible to students.

Q. Okay.

A. So when a student asks me a question, my job is to try and give them a precise answer.

Q. Okay.

A. In this circumstance, I think giving an imprecise answer is worse than not giving an answer.

Q. Okay. All right. So in Paragraph 18 you say that you assume defendants' misconduct directly influences sales. What do you mean by "influence"?

A. This is just restating the -- in this sentence I'm just restating the conclusion of

the Rosenthal report, which is that the misconduct is directly related to the shipments. So I'm really here just trying to refer to the Rosenthal report.

Q. But for the purposes of the way you use this assumption in your report, does this mean that but for the defendants' conduct, these shipments would not have happened?

A. What Professor Rosenthal's report says is but for the defendants' misconduct, here's what shipments would not have happened. I can then -- if she concluded that there was no misconduct and, therefore, there was -- therefore, that all of the shipments -- that none of the shipments were associated with misconduct, then the outcome of my model would be no damages, no harms at all.

Q. Do you intend to offer an independent opinion on any of the opinions in Dr. Rosenthal's report?

A. No, Dr. Rosenthal should offer an opinion on her report.

Q. Did you do anything on your own to validate any of the opinions that were offered

in her report?

MR. SOBOL: Objection to form.

You can answer.

A. There are several things that one does. One thing that one always does is look at the numbers and see, do they seem reasonable by various metrics, and so that is something that one -- that happens.

As I noted, we also as a group discussed the reports as we were going forward providing advice to each other, and so I would ask Professor Rosenthal questions, I would see things and remark, as would other folks, to give her advice as to what to do. So I know a fair amount about what she did and how she went about doing it. The final decisions were hers, and so she's the one who should talk about those decisions.

Q. Did you review her regressions?

A. As part of meetings that we had, she would show some of the regressions to the group and show some of the results of them, and then we would talk about the specifications and things like that.

Q. When did you first review one of her regressions?

MR. SOBOL: Was counsel present?

THE WITNESS: Counsel would have been present at all such discussions.

MR. SOBOL: Then I instruct him not to answer.

MR. KNAPP: As to the timing of when the meeting was? I'm not asking for the content.

MR. SOBOL: I'll give you the timing.

A. I don't know for sure. My guess is that it would have been around January --

MR. SOBOL: Don't guess. Give him a reasonable estimate or calculation.

A. A reasonable estimate would be around November to January.

BY MR. KNAPP:

Q. Did you identify any issues with Professor Rosenthal's regressions?

MR. SOBOL: Was counsel present?

A. Counsel was present.

MR. SOBOL: I instruct you not to answer.

BY MR. KNAPP:

Q. With respect to the final -- strike that.

For purposes of this question I want to focus on the final regression model that Dr. Rosenthal -- strike that.

I want to focus on the final regression models that Dr. Rosenthal built for purposes of her report. Did you identify any issues associated with those models?

MR. SOBOL: I instruct him not to answer, because you've got embedded in the question the communications.

If you want to ask him just if he has an opinion about it, I'm not going to instruct him not to answer about that, but it sounds like right now, to me, what you're asking about is what was discussed at meetings with the lawyers, which is not appropriate.

You can ask questions anyway. I'm actually trying to be helpful here.

BY MR. KNAPP:

Q. So, Professor Cutler, I'm asking about the final regression model that Professor

Rosenthal put together. Do you believe that the regressions that she ran were appropriate?

A. Yes, I do believe that the regressions Professor Rosenthal ran are appropriate.

Q. And you've adopted them as your own for purposes of incorporating the outputs into your model?

A. I have incorporated the outputs of Professor Rosenthal as an input into my model, with the understanding that I believe that they're appropriate.

Q. Did you run any sensitivity tests to see how her results would be impacted?

A. I did not run any sensitivity analysis on her models.

Q. What are the standard diagnostic tests that you would run when running a time series regression?

MR. SOBOL: Objection. Scope.

You can answer.

A. In any regression that one runs there are several diagnostics. One thing that one would do would be to look at the R-squared statistic or the adjusted R-squared statistic as

a measure. That is a measure of the goodness of fit of the model.

In addition, one would look at the predictions of the model relative to the actual data, so does the model seem to be fitting the data well, or are there aspects of the data that the model cannot fit well, and if so, that suggests that the model is not accurate and needs to be revised in some way.

BY MR. KNAPP:

Q. Based upon what you know from -- well, strike that.

Is a negative depreciation rate inconsistent with the literature on regressions?

MR. SOBOL: Objection. Scope.

You can answer.

A. Actually in a model of addiction, a negative depreciation rate would not be inappropriate at all. In fact, one way to interpret addiction is that the effects build up over time, so being -- having taken a drug first, one then needs an increasing amount of it over time, and that's going to show up as a negative depreciation rate; that is, the impact

of actions build over time rather than depreciating over time.

BY MR. KNAPP:

Q. Is there any specific literature that you're relying on for the statement that you just made?

A. There is theoretical literature in the economics of rational addiction that addresses it. I don't know offhand whether there are any empirical papers that would -- that estimate a negative depreciation rate, and I don't know in the sense that I just have not reviewed the literature. So it's not that I've reviewed the literature and I -- that is not a disguised way of saying no. That's just me saying I have not reviewed that literature well enough to see if anyone has estimated negative depreciation rate.

Q. Is there a particular paper that you're referring to in the economics of rational addiction that you think addresses this topic?

A. There are. I'm trying to remember if any of the papers have phrased it as in terms of a negative depreciation rate or whether instead they've just phrased it as -- mostly what they

phrased it as is complementary consumption over time, that is complementarity of consumption, so consuming more of the good today increases my margin utility of the good tomorrow.

In that framework, that is -- it's typically done through the utility function preferences that way rather than through the discount rate, in part because one wants to do welfare analysis, and so you really are thinking about a positive discount rate from the individual utility point of view. So I think most of the studies have not put it in the discount rate because they're not doing empirical analysis for which they're then saying what would be the impact on the estimated depreciation rate. They're doing theoretical analysis that says how would addiction show up in such a model.

Q. Sitting here today, there's not particular papers that you can identify?

MR. SOBOL: Objection. Asked and answered.

A. I don't have a specific paper that has translated it into a depreciation rate for a

regression like what Professor Rosenthal has run.

BY MR. KNAPP:

Q. Now, did -- strike that.

Professor Rosenthal estimated the impact of promotion in three different time periods, right?

A. That's correct, yes.

Q. And did you agree with that approach?

A. Yes, I did agree with Professor Rosenthal's approach.

Q. And is the reason that she looked at three different time periods because she assumed that there were three different structural breaks in the market?

A. She assumed that there were two different structural breaks in the market which led to three different time periods.

Q. Thank you. Good clarification.

Your model assumes that there's only a single structural break in the market, right?

A. That's correct, my model has only one structural break.

Q. If Dr. Rosenthal concluded that there

were two structural breaks, why does your model only account for one structural break?

A. The reason for the difference is that we're modeling two different things. So Dr. Rosenthal is modeling prescription drug shipments as the outcome variable, and the misconduct on the part of defendants as the explanatory variable. In that case one needs to think about how many breaks are there in the shipment variable, and she identifies those two break points, as we were talking about.

In my case the issue is not so much was there a change in the slope of shipments over time, but rather what impact does -- do the shipments of drugs have on the mortality outcome, and that doesn't necessarily have a break at any particular point in time when, for example, shipments of a particular set of medications ramp up. The model says that that has the same impact. It's only when the mortality framework changes, not so much the shipment framework, but it's only when the mortality framework changes that there would be a break in the mortality relationship.

Q. You understand that Dr. Rosenthal's measurement of the percent of MME's that were attributable to challenge promotion is a national average effect, right?

A. Yes, I do understand that.

Q. In your -- what your regression analyses do is you look at the geographic variation in shipments per capita to evaluate the relationship between shipments and mortality, right?

A. That's correct. I'm using a geographic level analysis.

Q. So if the marketing effects are national, to what would you attribute the geographic variation that you're analyzing?

MR. SOBOL: Objection.

A. We were talking earlier about the fact that the regression averages over, for example, shipments that may be more or less causing of harm. In the same way here, the regression is taking all shipments to the area and it's not making a -- it's not saying that -- I have no way to say, were the shipments in one county more or less caused by misconduct than shipments

in another county.

To the extent that they were, then there would be measurement error in the shipments variable; that is, some would be differentially due to misconduct and others might not be differentially due to misconduct. If those two are differentially associated with harms, I would then estimate an impact of shipments on mortality that was too low; that is, would not show an appropriate impact of inappropriate shipment of harms because it would be bringing in different outcomes in different counties that were -- that -- for which the effects are bigger and smaller.

BY MR. KNAPP:

Q. I want to hand you -- now, have you studied the different factors that motivate doctors to write prescriptions, or the variations in treatment among particular doctors?

MR. SOBOL: Objection to the form.

You can answer.

A. In this analysis I have not done that. As part of my academic work I both do some

analyses, and I teach about factors that motivate behavior of physicians.

So the answer is yes, in general, but no in this specific report.

BY MR. KNAPP:

Q. And you understand that in connection with the studying that you've done that doctors are strongly motivated to write prescriptions based upon their own belief about the appropriateness of treatment, right?

MR. SOBOL: Objection.

A. That's correct, that's one of the factors that enters into physicians' prescriptions is their own belief about effectiveness.

BY MR. KNAPP:

Q. And you've written about that in your paper "Physician Beliefs and Patient Preferences, A New Look At Regional Variation in Healthcare Spending," right?

A. I'm glad you've read it. I like that paper. Yes, I have.

Q. Okay. Would you agree that physicians are also motivated by prescribing standards of

care in terms of determining what types of prescriptions they write?

A. In general there are a lot of influences on physicians, one of which will be prescribing standards of care and one of which, as you said, was the physicians' perception about the effectiveness of a class of medications or a single medication within a class.

Q. And patient preference also impacts a doctor's motivations to write prescriptions, right?

MR. SOBOL: Objection.

A. The economic literature -- so I'm not testifying about it here. If you're asking about the economic literature, the economic literature does suggest that patient preferences are important, although the economic literature suggests that physician factors are far more important, supply side factors are far more important than are patient preferences.

BY MR. KNAPP:

Q. Drug reimbursement policy also impacts the types and volume of prescriptions that

doctors write?

MR. SOBOL: Objection. Scope.

You can answer.

A. Again, within -- again, with the proviso that I've not offered an opinion about that in this report, I'm going to answer this question as if you're asking me in general about the health economics literature. And in general within the health economics literature, it shows very much that the -- that insured -- that factors such as the restrictions in terms of prior authorization or costs do influence what physicians prescribe.

BY MR. KNAPP:

Q. And similarly, insurers' preferred drug list also influences the types and volume of prescriptions that doctors write?

MR. SOBOL: Objection. Scope.

You can answer.

A. That's correct. In terms of the general health economics literature, the formularies, the prior authorization, they all influence what physicians prescribe.

BY MR. KNAPP:

Q. And you would agree that prescribing decisions by doctors are complex decisions that are necessarily reliant on the individual examination of a particular patient, right?

MR. SOBOL: Objection. Scope.

You can answer.

A. I don't want to use complex because I don't know relative to simple, so I will just say that there are many factors that go into -- that often -- that often go into a physician's decision about prescriptions.

BY MR. KNAPP:

Q. Other than the factors that we've already talked about, any other factors that you've identified through the economic literature that motivate doctors to write prescriptions?

MR. SOBOL: Objection. Scope.

You can answer.

A. Again, certainly the literature has shown very clearly that promotion activity on the part of manufacturers influences what physicians do, what physicians prescribe, that recommendations from senior colleagues or

colleagues who are expert in a particular area can influence what physicians do. So I think there are -- there are a number of things associated with beliefs.

I group them into categories, maybe beliefs of physicians, financial incentives, and other constraints. And I think those three areas, each of them influence what physicians do.

BY MR. KNAPP:

Q. Have you determined that Rosenthal's, both of her direct and indirect models are economically sound and reliable?

A. I believe that her models are economically sound and reliable.

Q. Do you have a view on which model is more reliable?

A. I don't have a view as to which model is more reliable. I think in many ways the fact that both Professor Rosenthal and I have different models that reach relatively similar conclusions adds strength to each of the models.

Q. Now, if Dr. Rosenthal's opinions on the percentage of shipments that were influenced

by the defendants' misconduct changed, then your conclusions will change proportionately, right?

MR. SOBOL: Objection.

A. That -- not necessarily proportionately, in a strict proportional sense.

But yes, if Dr. Rosenthal's opinions change, that would influence the results that I present.

BY MR. KNAPP:

Q. So if the percentage that she's attributing to defendants' misconduct -- strike that.

If the percentage of shipments that she's attributing to defendants' misconduct drops from 10 to 5, the input in your model will have to drop from 10 to 5?

A. That is correct. If she were to drop her input, then that would directly translate into a reduction in the input I use in my model.

Q. And if a jury concludes that her calculations are wrong, then that would necessarily mean that your conclusions are wrong, too, right?

MR. SOBOL: Objection.

A. I don't think about it as a conclusion being wrong. What I have is a model that will translate in input, which is shipments due to misconduct into an output which is harm. That model will still be correct.

What one can then do is apply that model to a different estimate about what share of harms are due to misconduct on the part of defendants as a whole or any single defendant. It will yield an answer that's appropriate for that. That answer will not be wrong, no answer is wrong, it's sort of giving you for the appropriate input what is the appropriate output.

BY MR. KNAPP:

Q. Well, to be clear, if Dr. Rosenthal's opinion is excluded or rejected, you don't offer the court or the jury any way to link any harms to defendants' conduct, correct?

MR. SOBOL: Objection.

A. In order to calculate the harms, I would need an estimate from the court, from Dr. Rosenthal, from any other expert as to what share of harms are a result of defendants'

misconduct. With that, I could then estimate a damage calculation, a harm percentage.

BY MR. KNAPP:

Q. But you personally haven't done the calculation of the percent of shipments that are attributable to defendants' misconduct?

A. I personally have not done the calculation as to the percent of shipments that are attributable to defendants' misconduct.

MR. KNAPP: Why don't we break for lunch.

THE VIDEOGRAPHER: The time is 1:04 p.m., and we're off the record.

(Whereupon, a luncheon recess was taken.)

AFTERNOON SESSION

THE VIDEOGRAPHER: The time is 2:09 p.m., and we're on the record.

BY MR. KNAPP:

Q. Good afternoon, Professor Cutler.

Can you turn to Paragraph 10.1 in your report? And actually I'm looking at the sentence above 10.1. There's a reference to the effect of prescription opioids shipments on harms.

And I just want to clarify, when you are referring to harms in this report, what you're referring to is discrete events like an arrest; you're not referring to the costs associated with an event, right?

A. That's correct.

MR. SOBOL: Objection.

Don't forget about me.

THE WITNESS: I apologize, sir.

MR. SOBOL: And I'll call you Dr. Cutler from now on, okay?

A. In this report I show the impact on events such as arrests, autopsies, child

services issues. It's then Professor McGuire's report that translates those into dollar amounts.

BY MR. KNAPP:

Q. So if you look at Paragraph 11.4, it says "My Analysis of the Percentage of Costs," and then it goes on from there. You never actually look at the costs associated with any of these harms, right?

MR. SOBOL: Objection.

A. That's correct. It's -- that's correct. I don't specifically look at the costs here.

BY MR. KNAPP:

Q. So you assume that each harm has the same cost?

MR. SOBOL: Objection.

A. I don't assume that each harm has the same cost. Professor McGuire takes these estimates and then he uses them to calculate the cost burden faced by each of the specific agencies.

BY MR. KNAPP:

Q. So you don't weight your percentage of

harms that you say are attributable to opioids based upon the costs that are associated with any of those individual events, right?

MR. SOBOL: Objection.

A. I think that's correct. That is, I'm looking at, for example, the percentage of all autopsies which are opioid-related. If there were different costs for an autopsy for different reasons, that's something that Professor McGuire would need to take into account, but that's not something in this report.

BY MR. KNAPP:

Q. So for purposes of this question, let's just assume that non-opioid-related harms within a particular category of harms has a greater overall cost than the harms associated with opioids, okay? Do you understand the assumption?

MR. SOBOL: Objection.

A. Yes, I do understand the assumption.

BY MR. KNAPP:

Q. If in that hypothetical your percentage of harms attributable to the

defendants' misconduct was applied to the costs, then the cost estimate would overstate the cost attributable to opioids, is that right?

A. So that's an issue where Professor McGuire would need to have a different number, so he would need to not be able to multiply an aggregate percentage by a total dollar amount, and so he would -- he would require a different input than just, for example, the percentage of that activity which is due to opioids.

Q. And do you know if Professor McGuire made any adjustments in his cost calculations for the possibility that costs associated with opioid-related harms are less than costs associated with other non-opioid-related harms within a category of harm?

MR. SOBOL: Objection. Scope.

A. There is -- Professor McGuire did a number of things to back out different parts of the cost; that is, what the costs would be applied to. I don't recall whether he did anything specific on backing out if there were different -- within a category if there were different parts that would result from

opioid-related harms relative to non-opioid-related harms.

BY MR. KNAPP:

Q. So do you know -- well, strike that.

Do you agree with the way that Professor McGuire used your percentages in his calculation of the costs associated with the defendants' alleged misconduct?

MR. SOBOL: Objection. Scope.

A. Yes, I believe he used them appropriately.

BY MR. KNAPP:

Q. All right. If you turn to Paragraph 24, we're going to talk for a while now about what you refer to as the first step.

You say, "The first step requires estimating the share of various harms attributable to opioids."

Do you see that?

A. Yes, I do see that.

Q. For purposes of your model, what that means is but for the existence of opioids in the world, you're concluding that these harms would not have occurred, right?

MR. SOBOL: Objection.

You can answer.

A. I'm -- the specific calculation is what share of all the activity of the relevant -- of the relevant agency was a result of opioids. That by itself doesn't -- I'm trying to make fine distinctions in my mind, which I'm not able to express.

So it is -- yes, it is like if, if -- as if there were -- what share of the activity would not have needed to be undertaken if there were no opioid -- no harms from opioids.

BY MR. KNAPP:

Q. Well, let's try to make it concrete in the context of crimes, which is your first category.

A. Mm-hmm.

Q. What you're attempting to calculate is the number of crimes that would not have occurred if there weren't opioids in the world, is that right?

MR. SOBOL: Objection.

A. It's actually the percentage of crimes that result from the shipments of opioids above

the but-for level.
BY MR. KNAPP:
Q. So I'm going to try to put it in layman's terms.
MR. SOBOL: I've been objecting because you say "in the world," otherwise I probably wouldn't be, in case that matters to you.
MR. KNAPP: Okay. I appreciate it.
BY MR. KNAPP:
Q. Well, let's start with kind of a first principle.
If the percentage of harms that you identify would occur even without opioids in the United States, then you would agree that the defendants' hurt here could not be but-for causes of those harms, right?
MR. SOBOL: Objection. Scope.
A. I'm going to restate it. I'm going to say exactly what I -- what I agree with. These are harms that are resulting from the prescription opioids, and in some cases from the illicit opioids, so if there had been no prescription or illicit opioids then these harms

would not have occurred.
BY MR. KNAPP:
Q. Okay. So I want to talk about how you -- how you make that conclusion that there would be less crime in the world without opioids. So let's look at Paragraph 38.
You say, "Using the data described above, the next step in the analysis is to then determine the share of these crimes that were either directly or indirectly motivated by drugs."
Do you see that?
A. Yes, I do see that.
Q. And so for purposes of this model, you're assuming that "motivated by drugs" means that but for drugs these crimes would not have been committed, right?
A. In the case of the crime data, there are very clear definitions that the FBI uses, the national databases use in determining whether the crime was either caused directly by drugs or caused -- or resulting in some way from the fact that the individual was addicted to drugs.

Q. That wasn't my question.
My question is the conclusions that you're drawing from this data. And the conclusion that you're drawing is that but for drugs, these crimes would not be committed?
A. But for either the use of the drugs or the desire to have money to buy the drugs. Both of those categories are in the data that are attributed as being drug-related.
Q. Okay. And the data you rely upon to estimate the percent of crimes that would not have been committed in the absence of drugs is the NDIC study titled "Economic Impact of Illicit Drug Use on American Society," right?
A. There are a couple of different inputs. There are a couple of parts. One is what share of the use is -- what share of the crimes are by people who were either using drugs or were committing the crime to obtain money for drugs, and then that gets apportioned into an opioid part.
Q. And that -- those percentages you pulled from the Economic Impact of Illicit Drug Use on American Society from 2011, right?

A. Yes, that's correct.
Q. I'm handing you what's been marked as Exhibit 3.
(Whereupon, Cutler Exhibit Number 3 was marked for identification.)
BY MR. KNAPP:
Q. Now, this study relies on a survey that was conducted by the Bureau of Justice Statistics in 2002, right?
A. Yes, that's correct.
Q. And so you rely on a survey from 2002 to estimate the crimes in Summit and Cuyahoga through 2016 that would not have been committed but for drugs, right?
A. That is one part of the analysis that goes into it. That's not the only part of the analysis.
Q. The 2002 survey was a national survey, right?
A. Yes, that is correct.
Q. It was not specific to Cuyahoga or Summit?
A. No, it was not specific to either Cuyahoga or Summit.

Q. And you're relying on a question from the survey -- well, strike that.

Do you know which question you're relying on from the survey to identify your percentages?

A. Yes. Let me look at -- let me draw your attention in the report to Table 1.7, which I need to find. Okay. So the specific --

MR. SOBOL: Page.

A. -- data are on Page 58, Table 1.7, Jail Attribution Factors. And I had thought I remembered that it had the specific question, although I see that it is not here, so it must then be in the text, and so I don't recall off the top of my head the specific question that this is based on.

BY MR. KNAPP:

Q. Do you know, sitting here today, what the question was?

MR. SOBOL: Objection. Asked and answered.

A. Not the exact wording of it. I'd like to look through the report to find the question.

BY MR. KNAPP:

Q. So if we go back to your report, let's look at Table 3.3, which I believe is right after Paragraph 38, these are the percentages of crimes that you identified as being motivated by drugs, right?

A. Either committed by individuals on drugs, or to obtain drugs, or to obtain money for drugs.

Q. And for the percentage of crimes that you identified as being committed for -- to obtain money for drugs or to obtain drugs themselves, you assumed that there was a single factor that motivated that crime, right?

MR. SOBOL: Objection. Asked and answered.

A. I don't recall specifically whether the question here was about a single factor or whether they asked about multiple factors. I would want to go back and look at the specifics of the question here to answer that.

BY MR. KNAPP:

Q. So would you agree that if the survey didn't ask about whether drugs were their sole motivation or if there was other motivations,

that it wouldn't be reliable to use that percentage to say that these drugs wouldn't have occurred but for drugs?

MR. SOBOL: Objection. Asked -- go ahead.

A. Actually I don't agree with that statement, no.

BY MR. KNAPP:

Q. So do you know if the survey question asked the people who responded to it if their sole motivation to commit these crimes was drugs?

MR. SOBOL: Objection. Asked and answered.

He's indicated -- why don't you go back and look into the report and find the answer you want.

BY MR. KNAPP:

Q. Well, I can tell you the survey question isn't in there, so you're not going to find it in there.

A. Okay. Did you actually look at the survey, sir?

MR. SOBOL: He said he wanted to look

to see if it was there. Or do you not want him to look?

BY MR. KNAPP:

Q. I have a question for you. Did you look at the survey that you relied on, the results of which you relied on the data?

A. Yes, I have looked at the survey.

Q. So my question, without looking in that report do you recall if the question in the survey asked if the crime was motivated by a single factor?

A. I don't recall the specific question, no.

Q. The percentages that you have here assume that these crimes were motivated by a single factor, and but for that factor they would not have occurred, right?

MR. SOBOL: Objection.

A. I'd want to look at the question to be sure. But also there are a number of sources of uncertainty in estimates like this, and a number of reasons why they might also be low in addition to being high, so I don't have an overall sense that the results would obviously

have to be higher or lower than what's here.
BY MR. KNAPP:
Q. Do you have any reason to believe that anyone can identify the single factor that causes an individual to commit a crime?
MR. SOBOL: Objection.
A. I'm not a criminologist, so I did not design the survey. In general, when I design surveys or participate in surveys, there is some pretesting to make sure that the question elicits what one wants, so I don't know that that's what was done here, but that would have been a standard thing to do.
BY MR. KNAPP:
Q. You relied on this data without knowing if that standard pretesting was done, right?
MR. SOBOL: Objection.
A. I relied on it. And these data are also used by other studies in the literature, and so other authors have also relied on it.
BY MR. KNAPP:
Q. But you don't know if the survey did any standard pre-survey testing?

MR. SOBOL: Objection.
A. I did not look to see the history of the development of the survey, no.
BY MR. KNAPP:
Q. How many people responded to the survey?
A. Again, I'd like to check the number before giving you an exact answer.
Q. Can you estimate it sitting here right now?
MR. SOBOL: Do you want him to look at the report, or do you want him to --
BY MR. KNAPP:
Q. I'm asking what you know sitting here today. Do you know without looking at the report how many people responded to the survey?
A. No. And I'd rather not hazard a guess when the survey is sitting right in front of me.
Q. Do you know how many jails participated in the survey?
MR. SOBOL: With or without looking at the report?
A. Without looking at the report, no, I don't know.

BY MR. KNAPP:
Q. Do you know if any Ohio jails participated in the survey?
A. Again, I'd like to look at the report before answering. I do not know off the top of my head.
Q. Do you know if any jails in Summit County participated in the survey?
A. I'd like to look at the report before giving a specific answer as to whether jails in Summit County participated.
Q. Do you know if any jails in Cuyahoga County participated in the survey?
MR. SOBOL: Objection. Asked and answered.
A. I'd like to look at the report before answering how many jails in Cuyahoga participated in the survey.
BY MR. KNAPP:
Q. How many pages is the survey?
MR. SOBOL: Do you want him to guess that, too, or can he look at the report for that?
BY MR. KNAPP:

Q. I'm asking for your recollection.
A. I don't recall the number of pages in the specific survey. And as always, I don't wish to guess when one could know the answer for certain by looking.
Q. Do you know how long it took for anyone to complete the survey?
A. No, I don't know their estimate of the average time.
Q. And you mentioned that you've conducted surveys yourself, right?
A. I have been involved in projects where surveys have been conducted, that's correct.
Q. And you didn't conduct your own survey in connection with your report here about what crimes would occur in the absence of drugs?
A. No, I did not conduct a survey of anyone about what crimes would have been committed in the absence of drugs.
Q. So what did you do to assess whether this NDIC survey was representative of what motivates crimes in Summit or Cuyahoga County?
A. There are two answers to that. First is there are no surveys that I know of or that

anyone on our team was aware of that estimated specifically for those for either Cuyahoga or Summit County, so we -- I believe it would be impossible to get an answer that is specific to those counties.

Second, the data from this survey are standardly used in the literature, and so we were relying in addition to the -- obviously the readings here, we were relying on the literature that uses these data to estimate drug-associated crimes.

Q. When you say it's impossible to get an answer to what percentage of crimes were motivated by drugs in Summit or Cuyahoga County, you mean it's impossible based upon existing data sources, or it would be impossible to structure a survey that could come up with an estimate of that?

A. I meant that it was impossible based on existing data sources.

Q. You could conceivably set up a survey in Summit and Cuyahoga County to try to come up with percentages, right?

MR. SOBOL: Objection.

A. Yes, you absolutely could design a survey to do that. Of course, one couldn't have gotten historical data from a survey conducted now, but it could be done.

BY MR. KNAPP:

Q. Okay. So look -- if we look back at the report on Page 20, Table 3.3, what you've concluded here is that but for drugs, there would be 51.1 percent less cases of prostitution, right?

A. I just want to be very precise. 51.1 percent of prostitution crimes were either committed while on drugs, for -- to obtain drugs, or to obtain money for drugs.

Q. And I'm focused on how you use that data.

For purposes of your report, you assume that there would be 51.1 percent less cases of prostitution but for drugs in the world?

MR. SOBOL: Objection.

A. The contribution of drugs to prostitution is 51.1 percent.

The reason why I keep hesitating on

that is I don't mean it to imply that if you reduced the drugs now that you would eliminate 51.1 percent of the prostitution. As we spoke about earlier, being where you are means that if you then make changes it may have a different effect than if it hadn't have occurred in the first place. So the distinction I'm making is that the drugs having been there, it is, therefore, the case that 51.1 percent are related to drugs.

BY MR. KNAPP:

Q. So you can't say in a but-for world that there would be 51.1 percent less cases of prostitution in the absence of drugs?

MR. SOBOL: Objection.

A. You'd need to define what the term "in the absence of drugs" means. That may be a hypothetical, and I wouldn't want to answer a hypothetical question.

BY MR. KNAPP:

Q. Well, you're an expert that's opining on the causes of drugs in the world, and you're making conclusions here, so I'm going to ask you a hypothetical, which is -- well, strike that.

I'm asking what your conclusions are from this data. And do you or do you not agree that there would be 51.1 percent less cases of prostitution but for drugs?

MR. SOBOL: Objection. Asked and answered.

A. I will say the statement that I agree with. 51.1 percent of the cases of prostitution involve individuals who are either using drugs, engaged in prostitution to obtain drugs, or engaged in prostitution to obtain money for drugs.

BY MR. KNAPP:

Q. Sir, if you cannot say that these harms wouldn't have occurred but for drugs, how can you say that the defendants here are the but-for cause of any of these harms?

MR. SOBOL: Objection.

A. I want to make sure I'm -- there's a part of your statement which I don't want to agree with, which is a hypothetical that if we eliminated drugs we would eliminate 51.1 percent of prostitution. I'm not making a statement that going forward if we reduced shipments by

51.1 percent -- if we reduced shipments entirely we would reduce prostitution by 51.1 percent. I'm making a statement that because drugs had become so important, 51.1 percent of prostitution was associated with drugs.

BY MR. KNAPP:

Q. Now, to be clear, in this world you've created where there's no drugs, there would still be alcohol, right?

MR. SOBOL: Objection.

A. That's correct, there would still be alcohol.

BY MR. KNAPP:

Q. And there would still be poverty?

A. That's correct, there would still be poverty.

Q. There would still be income inequality?

A. That's correct, there would still be income inequality.

Q. There would still be unemployment?

A. That's correct, there would still be unemployment.

Q. There would still be depression?

A. That's correct, there would still be depression.

Q. There would still be anxiety?

A. That is correct, there would still be anxiety.

Q. There would still be mental illness?

A. That's correct, there would still be mental illness.

Q. And you assume for purposes of your calculation that these other factors that I just went through would not cause people to commit the percentage of crimes identified in Table 3.3, that's implicit in your model, right?

A. No, it's actually not implicit in the model. The -- those crimes, crimes committed for those reasons are, of course, included here, and so that's why these numbers are not 100 percent. It is not the case that 100 percent of prostitution or 100 percent of aggravated assault is a result of drugs, so all of those are still going on. They're all leading to crime. And then this is just the additional amount that comes because the drugs were so readily available, were shipped in such

quantities.

Q. Well, to be clear, Professor Cutler, this -- these figures are not limited to opioids, these are just all drugs, right?

A. That is correct, these are all drugs.

Q. But you're just not comfortable saying but for drugs in the world, any of these crimes would be avoided or wouldn't have happened?

MR. SOBOL: Objection.

A. I'm trying to -- I'm trying to make a distinction between the fact that the drugs were out there and what the impact was, and a hypothetical of eliminating the drugs. And I'm not making any statement about a hypothetical as to eliminating the drugs. I am -- nor am I making a statement that other factors are not important in crime at all.

All of these other factors are important in crime in this and in the other -- and in the other analysis that I do. All I'm making a statement about is the share of these crimes for which there was involvement of drugs and for which one of the purposes involved either directly drugs or money for drugs.

BY MR. KNAPP:

Q. All right. I'm going to hand you what I'm marking as Cutler Exhibit 4.

(Whereupon, Cutler Exhibit Number 4 was marked for identification.)

MR. SOBOL: This one must have sold tens.

BY MR. KNAPP:

Q. Okay. So tab 4 is "Economic Approaches to Estimating Benefits of Regulations Affecting Addictive Goods," and it's a study that you co-authored, right?

A. That is correct, yes.

Q. In this paper you recognize that policies that take away addictive goods or restrict consumption of illicit goods may lead to substitution into other, quote unquote, bads, right?

A. That is one of the points that's made by this paper, correct.

Q. How do you account for that substitution in your model?

MR. SOBOL: Objection.

A. I'm sorry, can you rephrase the

question, please? Can you restate the question, please?

BY MR. KNAPP:

Q. How do you account for what you refer to as substitution into other consumption bads in your model in this case?

A. In this case, one of the ways in which that shows up is the substitution from consumption of legal opioids into the consumption of illegal opioids. So that's one example where people substitute from one harm into another harm.

Q. Well, I'm talking about just this first step where you're calculating the percentage of crimes that are -- that you say are attributable to drugs. And do you account for at all the phenomenon that if there weren't drugs in the world, people might move to other consumption bads that would lead them to commit crimes, the exact same crimes that you've identified as being motivated by drugs?

MR. SOBOL: Objection.

A. In this specific table I haven't done anything to say that individuals would switch

into another harm, which harm would then cause them to commit crime.

BY MR. KNAPP:

Q. When you say you haven't done anything to say that individuals would switch into another crime, what you mean is you haven't done any analysis to say that individuals would not switch into other crime, right?

MR. SOBOL: Objection.

A. I haven't done any analysis as to whether individuals would or would not switch into other drugs, any other activities that would bring crime in the absence of drugs.

Q. So if you look at S.22 of your paper, Cutler Exhibit 4, do you see there's a -- I guess you'd call it a graphic in the top left there.

Do you see that?

A. Yes, I do see that.

Q. This is outlining the positive and negative affects associated with existing users who reduce their consumption of addictive goods, is that right?

A. Yes, that is correct. And then

there's a lower part on potential users who are deterred from initiation.

Q. And at the top part, one of the things that you look at is the negative effects of taking away or restricting consumption of addictive goods, right?

A. Yes, that is correct. That is one possible negative consequence.

Q. And one of the things that you identify is the loss of positive attributes of consumption, right?

A. Yes, that is correct.

Q. Where in your model do you account for the loss of positive attributes of consumption, assuming that opioid shipments did not happen?

A. So when we -- when I estimate the models here, when I present the models here, the models here with respect to crime and with respect to mortality are the net effect taking account of any harmful activity as well as any beneficial activity.

So if, for example, increased shipments of opioids in an area had led more people to be pain-free and able to work and

earning more and, therefore, not in some way engaged in criminal activity, that would show up in the crime regressions as a reduction in crime associated with increased shipments of opioids. What those regressions are giving is the net effect of the factors that -- where -- of the aspects where increased shipments lead to increased crime, net of the effects where increased shipments lead to lower crime. And on net what it's showing is a very strong increase in crime associated with shipments of opioids.

Q. To the extent that the benefits -- strike that.

To the extent that the loss of positive attributes of consumption manifest themselves in something other than mortality or crime, your model doesn't account for that, right?

A. This model doesn't look at the welfare consequences to the individual. It's looking at the impact on public services.

So, for example, if one were doing a benefit-cost analysis of opioid shipments as a whole, benefits for some people might be an

increased ability to work and the amount that they would earn, even if there were no impact on, for example, criminal activity. Losses to the individual or to their family would include morbidity consequences and mortality consequences. I have not estimated any of the benefits or the costs to the individual. So I'm not doing an individual benefit-cost or a social benefit-cost analysis here. I'm strictly looking at a government spending analysis here.

Just to contrast that, in the analysis that was -- that's being done for -- in this paper, there we are looking at a social calculation of benefits and costs. And so for a social calculation of benefits and costs, one wants to take into account the impact on the individual.

So, for example, an individual who lives longer because they're deterred from smoking, that is a social benefit. It doesn't show up here, the reduction in mortality doesn't directly show up as a loss associated with the individual not living as long.

Q. Have you ever heard of a concept

called addiction replacement?

A. Yes, I have heard of addiction replacement.

Q. What is that?

A. It's a term from psychology, I believe, that people who are addicted to one substance might also become addicted to another substance if the first substance is removed.

Q. What is the prevalence of addiction replacement in drug addicts?

A. I do not know what the prevalence of addiction replacement is in drug addicts.

Q. How does your model account for addiction replacement?

A. The models of -- so the regression models for mortality and for crime, each of those, to the extent that there's addiction replacement, would be -- would take that into account.

So, for example, suppose that people who used opioids in the absence of opioids would have used cocaine and they would have died of cocaine drug use. One would pick that up by looking at drug poisoning mortality overall, and

one would see that shipments of opioids are not associated with drug poisoning deaths overall.

Or similarly, looking at crime, if people who were using opioids, instead of opioids would have been using cocaine, just to take that example since you raised it, and, therefore, would have committed crimes associated with cocaine, then there would be no impact at all across areas in the relationship -- there would be no relationship at all across areas in shipments of opioid medications, shipments of opioid drugs and crime because there would simply be no tendency for crime to be higher in areas with more shipments if all those shipments were doing was just substituting for other addictive substances that would have led to crime.

Q. Professor Cutler, if all of the crimes in Table 3.3, let's go back to it, on Page 32 would have happened even now --

A. I'm sorry, Page 32?

Q. Page 20, Table 3.3.

A. Okay. Thank you. Just want to make sure I'm looking at the same table as you are.

Q. If all -- this is a hypothetical question. If all of these crimes still would have happened even without the existence of drugs, the first variable in your calculation in the percentage of harms attributable to these defendants would be zero, right?

MR. SOBOL: Objection. Asked and answered.

A. So if everyone would have committed crimes in the absence of drugs, then yes, these would all be zero. And then when we did the crime models at the end, they would show no relationship between opioid shipments and crime.

BY MR. KNAPP:

Q. Well, to be clear again, Table 3.3 is not just looking at opioids, it's looking at all drugs, right?

A. That's correct. That is correct.

Q. And you didn't run a regression on crime and the prevalence of all drugs?

A. No, we ran -- we ran the regression relating crime to opioid drugs, which is the correct one here because that would really say -- to test the drug substitution hypothesis

or the addiction substitution hypothesis you would want to relate it to the shipments of opioid medications because that would then directly test whether those shipments themselves led to increased crime, or whether those shipments simply substituted people from using other drugs into using those drugs and had no net effect on crime as a result.

Q. We talked earlier about the standard error. What is the standard error associated with this component of your calculation? And by "this component" I mean the percent of crimes that you attribute to drugs.

A. I don't have the standard errors immediately offhand. If I recall correctly, the report indicates the nature of the standard errors, but I don't recall it offhand.

Q. Does it indicate the nature of the standard errors for all steps in the calculation, or is it just for the regression, the regressions that you ran?

A. I was referring -- when I said the report indicates the standard errors, this report you identified as Exhibit 3 would

indicate the standard errors associated with the survey responses. So that those standard errors would come from the survey designer, and any survey designer would indicate what the standard errors are. I report the standard errors for the models that I do.

Q. But the survey designer did not use the results of the survey to say, you know -- well, strike that.

Let's turn to Paragraph 39. So after you have this calculation of crimes that you say are attributable to drugs, and you try to estimate the percentage of those crimes that are attributable to opioids, right?

A. Yes, that is correct.

Q. And is it fair to say you're not comfortable opining that the crimes -- those crimes would not have occurred but for the existence of opioids?

A. I think the answer is the same here, which is that what we're using for this are the estimates of the opioid contribution of those drug cases.

One of the reasons to do the analysis

of crime that we do in the report is to provide another independent way of validating these crime estimates. So if these estimates were off because people would have used some other drug, that would also show up in our crime models as no relationship between shipments and crime.

Q. So my question was a little different.

Do you have an opinion on whether the percentage of crimes that you identify as due to opioids would not have occurred if there were no opioids in the world?

MR. SOBOL: Objection.

A. So I think you're -- to the extent that you're asking --

(Phone interruption.)

MR. SOBOL: Oh, it's like the morning.

A. To the extent that you're asking about, for example, the substitution again, the answer is correct that this assumes that there would be no substitution into other types of activities which would have also led to the crime.

Q. Okay.

A. Or excuse me, another type of drug

that would have -- not activities, another type of drug that would have led to the crime. Excuse me.

Q. And for -- to calculate the percentage of drug crimes that are -- that you attribute to opioids, you use crime data from the National Forensic Laboratory Information System, right?

A. Yes, that is correct.

Q. And the NFLIS data, that's national-level data, right?

A. Yes, that is correct.

Q. And in that data there's no distinction between illicit opioids like heroin and prescription opioids, right?

A. Actually, let me just go back. These data, while they're national -- and I say here so I just wanted to check that before answering. The opioid share of reported drug crimes is calculated using the share of such tests undertaken by forensic laboratories in Ohio in which an opioid was detected.

Q. Got it.

So these are state-level data?

A. I misspoke earlier when I agreed with

your assessment -- with your statement that it was national. That's correct.

Q. So these are not data that are specific to either Cuyahoga or Summit, right?

A. That's correct. They're not specific to Cuyahoga or Summit.

Q. And do you know if the plaintiffs here have crime data for Cuyahoga and Summit that could be used to identify the percentages of laboratory testing that were -- that found an opioid?

MR. SOBOL: It's a yes or a no.

A. I'm sorry. Could you just repeat the question, please?

BY MR. KNAPP:

Q. Did you ask the -- well, strike that.

Do you know if the plaintiffs have data that identifies the percentage of drugs seized and tested by forensic laboratories in Cuyahoga and Summit that include an opioid?

MR. SOBOL: That's a yes or no.

A. No, I do not know if they have that information.

BY MR. KNAPP:

Q. And you didn't ask for that data?

A. As I indicated, I did not have the conversations with the officials in Cuyahoga and Summit, so I don't know whether that specific question was asked and answered negatively or not.

Q. You personally didn't ask for it, right, sir?

A. I personally did not ask for it, that's correct.

Q. How does the NFLIS study handle crimes when there are multiple drugs involved? Strike that. Let me ask a different question.

In the NFLIS study when there's multiple crimes -- strike that.

In the NFLIS study when there are multiple drugs involved, the NFLIS study doesn't weight the results based upon the volume of the drug found, right?

A. I would want to look back specifically at the NFLIS study to be sure before agreeing to that.

Q. Do you know one way or another if it weights crime statistics based upon the volume

of drugs that are found?

A. Off the top of my head, no, I do not know that.

Q. Did you make any adjustments in your report to address the possibility that NFLIS data does not weight the results based upon the volume of product?

A. No, we did not make any adjustments for that.

Q. All right. So then for other crimes that you identify as drug-related crimes, you use data on the share of people in Ohio with substance use disorder who have been diagnosed with opioid use disorder, right?

A. I'm sorry. Can you just repeat the question? I just want to make sure I process the whole question.

Q. So I'm down on Paragraph 39 at the bottom of the page, the last sentence there. To estimate the other drug-related crimes associated with opioids, what you do is you use the share of people in Ohio with substance use disorder who have opioid use disorder, right?

A. Yes, that is correct.

Q. And is what you're trying to estimate there the people who commit drug-related crimes who are motivated by opioids as opposed to some other drug?

A. Yes, that is correct.

Q. And why is the share of people with opioid use disorder a good proxy for that?

A. It is, of course, a proxy, and so every proxy could have possible errors. In this case, part of the -- probably the hypothesis that's going in is that the crimes are more likely to be committed by people who have use disorder than by people with, say, appropriate use, and so the use disorder is likely to be a good proxy for the part which is criminal.

Q. Well, to be clear, the crimes we're looking at, we're not just looking at crimes committed by people with opioid use disorder -- or strike that.

We're not just looking at crimes by people with substance use disorders, it's crimes committed by all people, right?

A. Yes. But remember that the definition is people who are committing the crimes while on

medication, or to obtain the drugs, or to obtain money to obtain the drugs, and so that implies a more severe form than just using the drugs.

Q. And you agree that not all people who commit crimes are -- have been diagnosed with substance use disorders, right?

A. Oh, that's correct.

Q. Do you know what percentage have been diagnosed with substance use disorder?

A. No, I don't know which people with -- who commit a crime have been diagnosed with substance use disorder.

Q. So you referred to an error, a potential error for when you use proxies. Is there an error rate associated with this component of your calculation where you're trying to calculate the percentage of crimes that are attributable to opioids?

MR. SOBOL: Objection.

You can answer.

A. There are two types of errors that economists traditionally think about. There's errors in measurement, for example, because one has a small sample and that one can calculate

the standard error associated with having a small sample. So, for example, one can obtain the standard error around an estimate of a percentage of people who have substance use disorder by knowing the size, the population size that was sampled and so on.

Then the second type of error is error associated with what's called model uncertainty, which is I'm not sure -- one can question whether the model is accurate or not. In that type of model uncertainty, it's difficult, if not impossible, to assign a specific standard error.

What -- the example of something that's used as a proxy for something else, it's -- while sometimes one can construct a measure of uncertainty, it's often the case that one cannot do so because you're asking whether if I had a different model in essence I would have had a different result, and I don't -- therefore, I don't have an estimate of the standard error associated with that part, because it's really asking if I could use a different model for that, how different would

the results have been.

Q. So in coming up with these percentages of crimes that you attribute to opioids, you didn't look at the details of a single case that was handled by a prosecutor in Cuyahoga or Summit County, is that right?

A. I did not look at any specific cases that were handled in either Cuyahoga or Summit County.

Q. And you didn't look at a single case that was handled by a public defender in Cuyahoga?

A. I did not look at any specific cases that were handled by a public defender in Cuyahoga.

Q. Did you look at any prosecutor data in Summit or Cuyahoga County to see if it identified crimes that involved drugs?

A. The -- as noted here, the forensic tests were done for Ohio, and so those identifications were specifically from Ohio. We also matched these -- so this is what share of the crimes were committed by people that -- were committed that are drug-related. Those then get

applied to the specific crime totals in Cuyahoga and Summit, crimes of each type in Cuyahoga and Summit, so those numbers are a part of the calculation.

Q. My question was, did you look at the actual records associated with any particular crime that took place in Cuyahoga or Summit County?

A. I did not look at the records of any particular crime, no. We looked at the aggregate numbers of crimes.

Q. Did you look at the LERMS database to identify whether there were -- the percentages that you're applying here are consistent with the law enforcement records in Summit or Cuyahoga County?

A. No, I did not look at the LERMS database.

Q. Do you know what the LERMS database is?

A. I have heard about it, yes.

Q. You didn't ask to access the LERMS database so that you could run searches across it to see if the actual law enforcement records

were consistent with the percentages that you're applying?

A. As I say, I did not do the specific asking, so I would want to go back and review the notes from the team that asked to determine what questions were asked about that and then what answers were given.

Q. Well, whether it was asked or not, you didn't personally look at the LERMS database to determine whether the crimes that actually took place in Summit and Cuyahoga County were consistent with the percentages that you're calculating in this first step of your calculation?

A. That's correct, I did not specifically look at LERMS database for this.

Q. All right. Let's move on to the next section, share of addiction and mental health activity attributable to --

A. I wonder if we could take a break so I could use the men's room --

Q. Let's do it.

A. -- and get some water.

THE VIDEOGRAPHER: The time is

3:08 p.m., and we're off the record.

(Whereupon, a recess was taken.)

THE VIDEOGRAPHER: The time is 3:22 p.m., and we're on the record.

BY MR. KNAPP:

Q. Professor Cutler, I want to circle back to a response that you gave to a question I asked about whether you asked to access the LERMS database, and what you said was, "as I said, I did not do the specific asking, so I'd want to go back and review the notes from the team that asked."

What notes are you referring to?

MR. SOBOL: Are they with counsel, or the presence of counsel?

A. I think I misspoke. I don't have any notes. I think I should have said I would want to ask the team that did the asking.

BY MR. KNAPP:

Q. So you don't have any written memos, written notes, whether it's handwritten, typed up, nothing like that from the team that conducted interviews?

A. No, I do not have any written,

handwritten, typed e-mailed notes.

Q. Did you ever have notes of that sort?

A. No, I never did have notes of that sort.

I apologize. I misspoke then.

Q. All right. So if we look at 23, you have "Share of addiction in mental health activity attributable to opioids." And I want to ask a similar question to what I asked on the crime data, is, are you opining that but for the existence of opioids in the world, the percentages that you calculate of addiction and mental health activity would not have happened?

MR. SOBOL: Objection.

A. Again, I just want to make clear the distinction between the fact that because there were opioids these services had to be provided which would not otherwise have been provided, versus the hypothetical of if one now reduced opioids would, therefore, these services no longer need to be provided.

On the first of those, that is what I'm opining, that because of opioids these services had to be provided and they would not

otherwise have had to be provided.

Q. So I want to ask you about the second -- the latter part of your answer, which is, are you opining that, let's say, back in 2006, but for the existence of opioids, Summit and Cuyahoga would have avoided the harms that you calculate for addiction and mental health activity?

A. Yes, had there not been the influx of opioids, then those harms in the ADAMHS Board in Cuyahoga and the ADM Board in Summit, those services would not have needed to have been provided.

Q. So let me make sure I understand this.

So if we look at Table 3.5, under Cuyahoga 2006, it says 3.3 percent opioid-related percent of services. So are you opining that there would have been 3.3 percent less services provided by the Cuyahoga ADAMHS Board but for the existence of opioids?

A. Technically, it's that 3.3 percent of their services were utilized by opioids that would not have otherwise need to. The 3.3 percent less is an issue that 3.3 percent of

the existing services is not exactly 3.3 percent less than the total. Other than that, that is correct.

Q. And for purposes of this part of your analysis, the results in Table 3.5, what analysis did you do that if there were no opioids, but for the existence of opioids, the people that you identified as addicted to opioids wouldn't have become addicted to other drugs?

A. In this analysis we did not assume any offset; that is, we did not assume that people who were addicted to opioids if there had been no opioids would have been addicted to anything else.

Q. So you didn't account for addiction replacement in connection with this calculation of the percent of treatment and addiction services associated with opioids?

MR. SOBOL: Objection. Misstates.

A. The ideal way to look at addiction offset is like what we did with the models of crime that are in the report, is to look at the harm as it relates to opioids because that is

the -- that nets out all the different factors for that.

Unfortunately, the data do not exist to allow one to do that in this circumstance, so I couldn't do a model that would try to look at the offsetting -- any potential offsetting effects the way that I could with the models for crime.

BY MR. KNAPP:

Q. All right. And so let's talk, then, about the data that you used to come up with these percentages. And I want to start with the Cuyahoga County ADAMHS Board.

And to come up with the percentages attributable to opioids, did you look at annual reports prepared by the Cuyahoga ADAMHS Board?

A. Let me refer you very specifically to what we did, which you'll find in the appendix, and so let me turn to the appendix. So you can see the --

MR. SOBOL: Where are you? The appendix is fairly limited, Doctor.

THE WITNESS: It's enough to give one a hernia.

Appendix III.D shows the specific data that are used in the -- that are used in the opioid-related percent of addiction and treatment services. III.D.1 is for Cuyahoga, and III.D.2 is for Summit County.

BY MR. KNAPP;

Q. Okay. Handing you what I have marked as Cutler Exhibit 5.

(Whereupon, Cutler Exhibit Number 5 was marked for identification.)

BY MR. KNAPP:

Q. Have you seen this document before, sir?

A. I believe I have, yes.

Q. And is this one of the documents that you relied on to calculate the opioid-related share of addiction and mental health activity by the Cuyahoga ADAMHS Board?

A. I would just want to check exactly to make sure that it's precisely what it is that's referred to in the report, so I'd be happy to do that if you wish.

Q. Well, if we look at Appendix III.D.1, panel B-2, sources and notes 1 to 15, you say

2009 to 2017 ADAMHS annual reports.

Do you see that?

A. Yes, I do.

Q. Do you know if this is an ADAMHS annual report, the document that I just handed you, Cutler Exhibit 5?

A. Yes, this is an ADAMHS annual report. Again, I just wanted to make sure that the numbers would match exactly, but yes.

Q. So point me to where in this Cutler Exhibit 5 you're pulling the data for for 2017.

A. Okay. Let me make sure I get the exact cite correctly.

So I'm sorry, so which number would you like to know about exactly? Could you just please repeat that part?

Q. I'm -- my question is where in this annual report did you pull the data from that's in your Appendix III.D?

A. And which specific row in III.D would you like me to point you to?

Q. Let's do assessment.

A. So which part of III.D are you looking at? Can you just let me know just the --

Q. Panel B.2.
A. Panel B.2. Okay. And then the assessment.
So the specific footnote refers to annual reports, Page 8, and the addiction services are here's the total of the addiction services, 23.3 million in the Page 8 and 23.28 million in the total addiction services spending in line 16 -- row 16, excuse me.
And then these would come from just taking the percentages, so the assessment number would come from taking the 2 percent in the assessment, or you can also see the 410,000 that's -- since these are in millions, the 410,000 in the column for 2017 in row 1 matches the 407,000 in the top pie chart on Page 8 of the annual report.
Q. So did you verify in connection with your report how the expenses identified in this annual report were calculated?
A. I did not personally, so we used the data from here. So I did not personally verify how these numbers were calculated.
Q. Are you aware that in 2012 the

Cuyahoga ADAMHS Board stopped reporting its Medicaid-related expenses?
A. No, I wasn't aware of that.
Q. You didn't account for that in your analysis?
A. No. I would need to -- I did not account for any Medicaid-related component.
Q. And you didn't speak with anyone at the ADAMHS Board to determine how they calculated the board's expenses by service category as they're reported in this report?
A. I personally did not. I don't know if that was part of one of the -- one of the other members of the team. I don't know if they spoke with them. It might also have been one of the lawyers might have spoken with them and obtained information, so I don't -- but I did not personally.
Q. Well, can you identify any particular information that was communicated to you by the lawyers or by your team that you're relying on for purposes of your report that you're relying on?
MR. SOBOL: Objection.

I instruct him not to answer.
MR. KNAPP: What's the basis for that if he's relying on the data for purposes of his report?
MR. SOBOL: You just asked him what the lawyers told him. He didn't say he has relied upon anything the lawyers told him.
MR. KNAPP: I limited my question to what he's relying on.
MR. SOBOL: I didn't hear it that way at all.
A. Could you repeat the question, please?
MR. SOBOL: You said lawyers or by your team.
MR. KNAPP: That you're relying on.
MR. SOBOL: Why don't you break it up. It's compound.
BY MR. KNAPP:
Q. Well, let's start with, can you identify any particular information that was communicate -- well, strike that. I'm going to break it up into pieces.
You didn't -- you personally did not speak with anyone associated with Cuyahoga

ADAMHS Board, right?
A. Correct. I personally did not speak with anyone at the ADAMHS Board.
Q. And you don't -- you can't say sitting here today if anyone on your team spoke with anyone from the Cuyahoga County ADAMHS Board, right?
A. That's correct. I don't know whether anyone on the team spoke with the ADAMHS Board.
Q. You can't identify any information that was communicated to you by anyone about the ADAMHS Board that you're relying on for purposes of these calculations, right?
MR. SOBOL: I instruct him not to answer to the extent it might involve an attorney-client -- excuse me -- an attorney communication.
A. With respect to non-legal communications, I do not know of any direct communication about these specific data from a member of the ADAMHS Board.
BY MR. KNAPP:
Q. Okay. If you look at Page 11 of the annual report, Cutler Exhibit 5, do you see

there's a pie chart down at the bottom?
A. Yes, I do see the pie chart.
Q. Identifies opioid-type dependence?
A. Yes, I see that.
Q. Do you know what that -- what opioid-type dependence means in connection with this report?
A. I believe that refers to, as the words say, any type of opioid dependence.
Q. So a dependence upon any type of opioid would fall within this category? That's your understanding?
A. Yes, that is my understanding.
Q. What's the basis for that understanding?
A. The basis -- so what I would first want to do is check to make sure my understanding is correct by looking specifically at where the data come from, and then what I would do is the basis for that would then be the report itself and our reading of the report.
Q. Do you know if opioid-type dependence includes dependence on any drugs not including opioids?

A. I don't know the answer offhand, and I would want to look through specifically to see.
Q. I want to circle back to my question about Medicaid expenses with respect to the Cuyahoga County ADAMHS Board. Do you know if Medicaid-related expenses were included in annual reports prior to 2012?
MR. SOBOL: Objection. Asked and answered.
A. No, I do not know about the treatment of Medicaid.
BY MR. KNAPP:
Q. You don't know how it was handled in these reports or in your report?
MR. SOBOL: Objection. Asked and answered.
A. In the report, not off the top of my head. I would want to do a little bit of -- I want to -- I would want to look at each of the numbers in specific before giving you an answer.
BY MR. KNAPP:
Q. Well, let's assume that Medicaid expenses are in the data prior to 2012 and not in the data after 2012. If that's the case,

would you want to pull out the Medicaid expenses from prior to 2012?
MR. SOBOL: Objection.
A. What we're interested in here is what percentage of the activity of the boards is related to opioids. First what share of the activity is related to drugs, and then second is what share of the activity is related to opioids. What I would want to do is to look and see how each of those percentages varies over time with the components that the ADAMHS Board has included.
BY MR. KNAPP:
Q. But you haven't done that, correct?
A. That's correct, I have not made any adjustment over time.
Q. Okay. Did you speak with anyone at the Summit County Alcohol, Drug and Mental Health Board in connection with preparing your opinions here?
MR. SOBOL: Objection. Asked and answered.
A. I personally --
MR. KNAPP: This is now Summit. We

were talking about Cuyahoga before.
MR. SOBOL: I was thinking about this morning.
A. I personally did not speak with anyone at the ADM Board in Summit.
BY MR. KNAPP:
Q. And you personally didn't verify how any of the expenditures in Summit County's ADM Board's annual reports were prepared?
A. That's correct, I personally did not verify it with anyone at the ADM Board.
Q. You calculated the harms related to addiction services for both licit and illicit opioids, right?
A. Yes, that is correct.
Q. And you don't have any calculation in your report that shows the harms associated solely with licit opioids, correct?
A. In this specific component of the share of ADM and ADAMHS spending that are associated with opioids, those specific shares do not differentiate between use of licit and illicit opioids. We do other things in the report to pull apart the parts that are due to

each as you -- as we were talking about, for example, with the direct and the indirect models.

Q. But at this step in your calculation when you're calculating the harms that you say are associated with opioids, you don't differentiate between licit or illicit?

MR. SOBOL: "This part" being?

MR. KNAPP: The calculation that's reflected in paragraph -- well, let me get the right table. Table 3.5.

A. Can you just refer me to the page, please?

BY MR. KNAPP:

Q. 24.

A. Thank you.

That is correct. In Table 3.5 we do not make any differentiation as to licit and illicit opioid services.

Q. And so if a jury finds that the defendants cannot be held responsible for harms caused by illicit opioids, you can't identify the portion of treatment and addiction services that are limited to licit opioids, correct?

A. That's correct.

MR. SOBOL: Objection to form.

Go ahead.

A. That's correct. One would need to do additional data analysis to try to pull out the parts which are due to licit and illicit opioids.

BY MR. KNAPP:

Q. Okay. Let's turn to Paragraph 44. And 44 -- strike that.

In Paragraph 44, you're describing how you calculated the share of children's and family services activity attributable to opioids, right?

A. Yes, that's correct. That paragraph discusses calculating the share of children's services due to opioids.

Q. Does Table 3.6 reflect the percentage of child removals in each year that you believe would have been avoided but for opioids?

A. Again, I want to make the distinction. Because of the widespread shipments and use of opioid drugs, these were child-related services that would not otherwise have needed to occur,

but that's not saying anything about if one were to reduce opioids at this point would those services disappear.

Q. Do you mean at this point as in 2000 -- April 26th of 2019?

A. That's correct.

Q. And so you are opining that if there were no opioids in 2006, there would be 4.5 percent less opioid-related removals in Cuyahoga children and family services?

MR. SOBOL: Objection.

A. Technically you're mixing up the 4.5 percent. So the 4.5 percent is of the services provided in 2006. That's not the reduction in what the services would be because of the difference in the denominator, but yes.

I'm sorry. I don't mean to be pedantic about the --

BY MR. KNAPP:

Q. No, it's a different calculation, so I want to make sure I understand it.

Can you explain to me how you would calculate the -- hang on one second. Strike that.

So if we look at Table 3.6, you estimate that in 2017 there would be 27 -- strike that.

In 2017 you estimate that 27 percent of the child removals in Summit County are opioid related, right?

A. Yes, that's correct. In 2017, it's 27 percent in Summit County.

Q. And so if we were trying to calculate what that implies in terms of a but-for percentage of removals, that -- strike that.

Can you just explain how you would calculate the percentage of removals that would have occurred in your calculation but for the existence of opioids?

A. I think the safest statement here is that 27 percent of the child service -- of the child removals were associated with opioids, and therefore those 27 percent of services would not need to be provided but for the opioid epidemic.

Q. Okay.

A. Those 27 percent of the total of existing services.

Q. And just to be clear, in this but-for

world with respect to child removals, there would still be poverty, right?

A. That's correct, there would still be poverty.

Q. And there still would be alcohol abuse?

A. That's correct, there would still be alcohol abuse.

Q. Still be abuse of other drugs?

A. That's correct, there would still be abuse of other drugs.

Q. Still be mental illness?

A. That's correct, there would still be mental illness.

Q. There would still be teenage pregnancy?

A. That's correct, there would still be teenage pregnancy.

Q. There would still be depression?

A. That's correct, there would still be depression.

Q. There would still be unemployment?

A. That's correct, there would still be unemployment.

Q. There would still be domestic violence?

A. That's correct, unfortunately there would still be domestic violence.

Q. There would still be child neglect and abuse?

A. That's correct, there still would be child neglect and abuse.

Q. And so your analysis assumes that these factors played no part in the 27 percent of child removals in Summit County in 2017 that you attribute to opioids?

A. I don't think that's correct. Those may have also been occurring, but the opioid -- but the removal was related to the opioids, but I don't think it says those were not occurring at all. So it doesn't say, for example, that the family was not in poverty, it doesn't say that the family was not a single-headed family or a family of a teenage mom.

Q. You said the removal was related to the opioids. What is the basis for that statement?

A. So that comes from the Public

Children's Services Association of Ohio which has its report on the opioid epidemic's impact on children's services in Ohio.

Q. And so is it your understanding that that report identifies opioids as the cause of the child removal in 27 percent of the cases in Summit County in 2017?

MR. SOBOL: Objection.

A. The -- let me call your attention to the footnote of Appendix III.E.2, the first note of that table, which is on Page 2 of Appendix III.E. "25 percent of children taken into custody in 2015 had parents using opioids at the time of removal."

BY MR. KNAPP:

Q. Right. So let's -- that's a good distinction. Let's focus on 2015.

So the report that you're relying on contains data from 2015, is that right?

A. Yes, that is correct.

Q. And I just want to make sure if you understand what that data reflects. Do you believe that the data for 2015 says that 25 percent of the child removals in Summit

County were caused by opioids?

MR. SOBOL: Objection. Asked and answered.

A. I want to look back at the report to use the -- to get the specific language that's used. Here we have -- I have parents using opioids at the time of removal, but I want to look back because I think it may have been a little stronger language in the report.

BY MR. KNAPP:

Q. In the report, the opioid epidemic's impact on children's services in Ohio, you believe the language is stronger?

A. That's correct. I want to look at the language to be sure in the PCSAO report. I would like to look back at that language.

Q. Does your model -- strike that.

Your Table 3.6 implicitly assumes that the opioid was the cause of the child removal, correct?

MR. SOBOL: Objection.

A. Not so much the cause as that the removal would not have occurred had the family not been using opioids, so it tipped the scale

in terms of removal.
BY MR. KNAPP:
Q. And you believe that the survey that you looked at supports that conclusion?
A. Yes, I do. And, again, I'd really like to get the specific language if that's an issue.
Q. Well, let me ask you this.
Did you see the survey that you're relying on that's reported -- the results of which are reported in -- actually, you know what? Strike that.
Let me mark this.
(Whereupon, Cutler Exhibit Number 6 was marked for identification.)
BY MR. KNAPP:
Q. Handing you what's been marked as Cutler Exhibit 6. Is this the report that you're relying on for the percentages in Table 3.6?
A. Yes, this is the report that's used in Table 3.6.
Q. And if we look at the tenth page, it says "Impact of opioid epidemic on children."

Is that where you're pulling your percentages from?
A. Yes, that is correct.
Q. And this particular data relies on a PCSAO opiate survey, correct?
A. That's correct. This is a survey by the Public Children's Services Association of Ohio.
Q. Did you see any of the survey questions?
A. No. I don't think I saw the survey questions for this.
Q. Did you see any of the completed survey forms?
A. I have not looked at the completed survey forms.
Q. Did you see any of the underlying data?
A. My understanding is that these are the underlying data that was reported to PCSAO.
Q. Have you seen the underlying data? There has to be numbers that make up these percentages, right?
A. I have not seen a specific form that

was filled out by any particular county in Ohio.
Q. And do you know how many cases of child removals are reflected in this survey?
A. It varies by the county. The counties -- if I recall the survey correctly, the counties were asked about all child removals in the county.
Q. You say you recall the survey correctly, yet did you testify that you haven't seen the survey, though, correct?
A. If I recall -- that's correct, I haven't seen the survey. I have seen the reports and I've read some of the deposition transcripts from others who were asked about the PCSAO survey and its reporting.
Q. Okay. If we look at what Page 10 says, it says "Impact of opioid epidemic on children. 28 percent of children taken into custody in 2015 had parents who were using opioids at time of removal."
Do you see that? It's the text on the -- big blue text on the right.
A. Yes. Yes, I do see that. Thank you.
Q. Where does it say in this report that

the opioid tipped the scales, as you said, to cause the removal?
A. I'd like to look back and see the specific question that was asked of them. And it may be I'm remembering it incorrectly or it may be that I'm remembering it from one of the depositions, but I -- so I just want to be -- I would like to be certain before saying that.
Q. You can look at the report.
A. Okay. If I recall correctly, it's not in this specific report because one would need the survey data. And then I'm trying to remember whether, for example, it was in the deposition testimony or whether I had seen it somewhere else, but I don't recall off the top of my head a specific source for the exact question that was asked of the counties.
Q. But your -- you believe that the results of the survey indicated that the opioid use is what tipped the scales to require a child removal?
A. I don't want to state that with 100 percent confidence that that's true because I don't recall it 100 percent for sure. So let

me say that I'd like to go back and look at the specific question that was asked of the county.

Q. Your figures in Table 3.6 implicitly assume that the opioid is what caused or tipped the scales to result in the child removal, right?

A. Correct. Here the 25 percent is that those removals would not have occurred in the absence of the opioids.

Q. Do you see any survey data on the percentage of removals that involved opioid use from prior to 2015?

A. I have not seen any data from Ohio that are as reliable that are from prior to 2015.

Q. And what you did is you back casted the percentages that you're estimating based upon this 2015 survey, right?

A. That's --

MR. SOBOL: Objection.

A. That's correct. We estimated back casting and then forecasting to 2016 and 2017 from the data in 2015.

BY MR. KNAPP:

Q. You didn't see any data about child removals from prior to 2015 that would give you comfort that you could accurately back cast based upon this 2015 survey?

MR. SOBOL: Objection.

A. There was no comparable survey that was done by PCSAO or any other organization that was comparable to this that we could use to look farther back in time.

BY MR. KNAPP:

Q. So I understand there was no comparable survey. I'm asking what gave you comfort that you could back cast in prior years based upon the 2015 report?

A. The back casting that we're using from the 2015 report is based on the share of people with substance use that are related to opioids from the ADAMHS Board and the ADM Board. Those -- again, substance use disorder is a very severe form of utilization, and, of course, child removals is a very severe form of interaction with a family -- with a troubled family, so I was -- I felt confident in using the severe form of use disorder to back cast the

severe form of child intervention.

Q. And so what evidence do you have that the trend of opioid use disorder in these counties is applicable or a good proxy for child removals in these counties?

A. I'm sorry, can you just repeat the question, please?

Q. What evidence do you have that the trend of opioid use disorder in these counties is a good proxy for child removals in these counties prior to 2015?

A. Unfortunately, without a good time series of data that are comparable to this, I don't have any way of benchmarking this with other information.

Q. Do you understand if people with children are more or less likely to use opioids, to abuse opioids? Strike that.

Do you understand if someone with a child is more or less likely to abuse opioids?

MR. SOBOL: Objection.

A. That's an epidemiological question about abuse of opioids, and I don't know the answer off the top of my head. I would want to

consult with epidemiology papers on opioid abuse.

BY MR. KNAPP:

Q. You didn't get the answer to that question before using the trend of opioid use disorder to project and back cast child removals in Summit or Cuyahoga County, right?

A. I don't think that question is relevant for whether this is an appropriate way to extrapolate.

Q. My question wasn't whether you think it's relevant or not. You didn't do it, did you?

MR. SOBOL: Objection. Asked and answered.

A. I didn't do it because it wasn't relevant.

BY MR. KNAPP:

Q. Now, to be clear, Paragraph 10 doesn't reflect whether the parents involved in the 25 percent of removals in 2015 that were using opioids were also abusing alcohol, does it?

A. Let me just be sure. You said Paragraph 10. Did you mean by that Page 10?

Q. Page 10 of the -- of Cutler Exhibit 6.
A. Okay. I just wanted to be sure you weren't referring to Page 10 of the report in some way.
That's correct, this chart does not show whether these parents were using other substances at the time.
Q. And this report also doesn't show if they were sent to jail for some other reason other than opioids?
A. That's correct, it doesn't say whether they were sent to jail for any other reason.
Q. Did you review -- strike that.
You mentioned that you reviewed some deposition testimony that talked about this survey. Do you recall what deposition it was that talked about this survey?
A. If I'm not mistaken, the deposition of Cynthia -- I'm going to butcher her last name, for which I apologize -- Weiskittel spoke about this survey.
Q. And did you review the exhibits to that deposition?
A. No, I did not review the exhibits to

the deposition.
Q. Do you know if one of the exhibits to that deposition was an exhibit calling into question the accuracy of the data in this report, Cutler Exhibit 6?
A. No, I don't know anything about any of the exhibits in that deposition.
Q. So if there was a document that was produced by the plaintiffs here that called into question the accuracy of the data in this survey, is that a document that you would have wanted to see?
MR. SOBOL: Objection.
A. I think you said a document produced by the plaintiffs in this case.
BY MR. KNAPP:
Q. Correct.
A. Without answering with respect to the plaintiffs or the defendants, if there were a document about the accuracy of the survey I would be -- I would want to see it.
Q. Okay. We've talked about standard error on your other calculations. What is the standard error associated with your calculation

of the share of children's and family services due to opioids?
A. I'm sorry. With respect to the share of -- just say the last part of that sentence again, if you would, please.
Q. Well, let's make it easier. What is the standard error associated with your calculations reflected in Table 3.6?
A. I have not estimated a standard error for them, so I can't tell you off the top of my head what that is.
Q. So if we look at 2015 and compare the opioid-related percentage of removals in Cuyahoga and Summit, do you see it's 25 percent in Summit and 11 percent in Cuyahoga?
A. Yes, I do see that.
Q. To what do you explain -- or strike that.
To what do you attribute the significant difference in the percentages in the two counties?
A. I have not done any analysis of why those two numbers differ so I could come up with hypotheses, but I do not have an -- I have not

investigated or report on any answer to that.
Q. You have investigated the shipments of opioids into these counties, right?
A. That's correct, I have investigated the shipments into the counties.
Q. Did you investigate whether the shipments of prescription opioids in these counties could account for the difference in the opioid-related percent of child removals in Summit and Cuyahoga in 2015?
A. I did not do a cross-section analysis. I don't -- I don't report a cross-section analysis of whether the shipments of opioids into a county are related to the percent of child removals from parents who are using opioids in that county.
Q. Based upon what you know about the shipments in the Cuyahoga and Summit County, do you believe that the shipments of prescription opioids can explain the substantial difference between the percentages in Summit County and Cuyahoga County?
MR. SOBOL: Objection.
A. I haven't done the analysis, so I

can't say for sure. One would need to know about the relationship between shipments of opioids and child removals, and whatever that coefficient is would be used to establish what -- to what extent this was due to opioids.

BY MR. KNAPP:

Q. Did you ask to see any county data from either Summit or Cuyahoga County to see if it backed up or supported the percentages in the statewide survey that you relied on?

MR. SOBOL: Objection.

A. My understanding is that these data were reported by county authorities to this -- to the public PCSAO, Public Children Services Association of Ohio, so that this was a tabulation of the raw data by the counties.

BY MR. KNAPP:

Q. My question was, did you look at any of the county-level data to see if it supported the numbers in the survey --

MR. SOBOL: Objection.

BY MR. KNAPP:

Q. -- or in the report?

MR. SOBOL: Objection.

A. If you're asking did I look at the specific form that was submitted to PCSAO, no, I did not look at any of those specific forms that were submitted. I presumed that PCSAO when they published this correctly reported what the counties told them.

BY MR. KNAPP:

Q. The percentages that are reflected in Table 3.6 reflect opioid-related removals associated with both licit and illicit opioids, right?

A. That is correct, no differentiation is made here between removals associated with licit and illicit opioids.

Q. And you didn't calculate the percentage of Children and Family Services that were related to licit opioids only, correct?

A. That's correct, I did not do a calculation about child removals related to use of licit opioids only.

Q. Okay. Let's move to juvenile court activity, Paragraph 45. And in this section you are estimating the share of juvenile court activity attributable to opioids, right?

A. That's correct. This section is about juvenile court activity attributed to opioids.

Q. And you include harms attributable -- strike that.

You include harms attributable to drug-related crimes and harms related to child removals, right?

A. That's correct, it's both drug-related crimes and child removals.

Q. For juvenile court activity, is there any overlap in the harms that are caused by juvenile crime and child removal cases?

A. I'm not sure I understand the question. Could you rephrase it?

Q. So you're looking at specific incidents in the juvenile court, right?

A. Mm-hmm.

Q. And my question is, is there any overlap where a case involved an incident of a juvenile crime as well as a child removal?

A. I don't know for sure. I would guess there would be.

Q. And how did you account for that overlap in connection with the calculations that

you report on Table 3.7?

A. Let me look back at the appendix just to be certain so I give you the correct answer. Appendix III.F.1. And, of course, III.F.2 would be the corresponding one for Summit.

So we have the -- so if you were to look at panel A, the first thing that we calculate is the opioid-related delinquency and unruly charges as a share of the total of the delinquency and unruly charges. That then gets multiplied by the total number of such cases to get an opioid-related percentage of -- or I'm sorry.

We take the opioid-related percentage of delinquency and unruly charges and multiply it by the delinquency and unruly cases so that we get the opioid-related delinquency and unruly cases. That then gets added into the number of the opioid-related percent of removals.

So it's -- so I think the question that you're asking me about is coming in the upper half of this table, which is where we pull out the opioid-related delinquency and unruly charges component.

Q. So I'm going to ask the same question that I've asked with respect to the other categories of harms, are you opining that but for the existence of opioids there would have been -- 1.6 percent of juvenile cases would have been avoided in 2006?

MR. SOBOL: Objection.

A. That is correct, my calculation is that 1.6 percent of the cases are attributable to the fact that opioids were more commonly available.

BY MR. KNAPP:

Q. So for this analysis, just as with the general -- well, strike that.

For your estimate of delinquency and unruly cases associated with opioids, you rely on the 2002 Bureau of Justice statistics survey that we talked about earlier with respect to the general crime analysis, right?

A. That is correct, yes.

Q. And you don't have any other data sources with respect to the estimate of -- well, strike that.

Do you know if any juveniles

participated in the 2002 Bureau of Justice statistics survey?

A. I don't know if there were any juveniles in the 2002 survey.

Q. So what's the basis for your conclusion that that survey reflects the percentage of juvenile crimes that are motivated by drugs in Summit and Cuyahoga County?

A. In many respects the age differences between the juvenile cases and many of the adult cases that are going to involve crime won't be so big. So as is well-known, crime tends to skew younger in the population. So in practice, these are likely to be more similar populations than just the distinction between juvenile and adults would make one think.

Q. Did you do any analysis to see if the data actually supported that hypothesis that you just stated?

A. Unfortunately, I was not able to do any data analysis to support that.

Q. You didn't review any records of any individual juvenile cases to see if they were motivated by opioids?

A. I did not review records of specific juvenile cases.

Q. You didn't look at the SACWIS database when you were trying to estimate the percentage of crimes, juvenile crimes that are attributed to opioids?

A. We actually did consider the SACWIS data and -- but decided not to use the SACWIS data.

Q. Why did you decide not to use the SACWIS data?

A. There are two reasons for it. The first one is that theoretically the -- not theoretically. Excuse me. The data only reports a single cause, so if opioids were a contributing factor but the individual filling it out -- there were other things going on so the individual filling it out chose something else, the opioids would not be noted.

And then second, the SACWIS data, if I recall correctly, do not identify the specific type of drug prior to very recent years, so it would not be able to go back in time.

Q. So let's take those in turn. Why is

it a limitation -- well, strike that.

If the purpose of Table 3.7 is to identify the percent of juvenile cases that are attributable to opioids, why is it a limitation of the SACWIS data that it only identifies a single cause of a crime?

A. There may have been multiple cause -- causes associated with, for example, child removal. Opioids may have been a key component of that. It may very well have been that the child would not be removed but for the presence of opioids, and yet still that wouldn't necessarily have been reported in the SACWIS data.

Q. So what you're showing in Table 3.6 is -- I'm sorry, in Table 3.7 is the percent of juvenile court activities that has any relationship to opioids, is that right?

MR. SOBOL: Objection to the form.

A. It's based on the same crime metrics as are in the adult -- that are -- excuse me -- that are -- that we were talking about earlier, which are crimes for which the individual was -- either committed the crime because he or she was

on opioids, to obtain money for opioids or drugs, or to obtain drugs directly. So it's not any -- not every crime in which the individual had any use of opioids would be counted in that.

BY MR. KNAPP:

Q. The second limitation that you identified in the SACWIS data is that it didn't identify the type of drug until a certain period of time. What period of time was that?

A. If I recall correctly, it's from 2014 on, but I would want to check for certain before saying that with absolute certainty.

Q. Did you review the SACWIS data after 2015 to see if it supported the percentages that you calculated in Table 3.7?

A. We did -- I did. We did review the SACWIS trends. And, of course, there's only a couple of years. In general, they didn't -- they looked reasonably consistent, but there's no real statistical test one can do with just a couple of years, so there's nothing one can say that I've concluded statistically significantly that the trends were the same in the two sources of data.

Q. So I just want to make sure we're clear. You had access to a database that had information specific to someone in Cuyahoga County that identified a single cause of juvenile criminal court activity that you did not rely on for purposes of estimating the opioid-related percent of juvenile court activity, is that correct?

MR. SOBOL: Objection to the form.

A. I relied on the data that I thought were the most accurate, and so my economic determination was this was a more accurate way of estimating it than data that are generally agreed to be underestimates of the true percentage.

BY MR. KNAPP:

Q. If we look at Table 3.7 again for 2017, do you see that the percentage of juvenile cases in Summit County is about one and a half times the percent in Cuyahoga County?

A. Yes, I do see that the rate is higher in Summit County than in Cuyahoga County.

Q. How do you explain that difference?

MR. SOBOL: Objection.

A. I don't do any analysis here to explain the cross-section difference between the two counties. Of course, in general there are a lot of different theories that could be offered, and with only two counties there's no way to tell for sure which theory would be more appropriate. So I don't have -- I don't state and I don't have an opinion as to why it's higher in one than in the other.

BY MR. KNAPP:

Q. You didn't do an analysis to determine if pre-2016 shipments could explain the difference in the percentages between Cuyahoga and Summit?

A. I did not. So first off, with only two data points you can't really do an analysis of that because there are many more theory -- there are many more theories than just that, that is with two data points. I could come up with a million theories that would fit the data well.

If in -- if all states and all counties had -- if all states or the nation had data for all counties, one could imagine doing a

type of cross-sectional analysis of juvenile crime as it related to opioid shipments. With a sufficiently large sample, one could imagine doing that kind of analysis. Those data don't exist, so unfortunately I was not able to do an analysis like that.

Q. So your -- the percentages of opioid-related juvenile court activity includes harms related to both licit and illicit opioids, right?

A. That is correct. These estimates include harms related to both licit and illicit opioid activity.

Q. And so you didn't calculate the percent of juvenile court activity that's related to just licit opioids, correct?

A. That is correct, I did not calculate the share which is due to just licit opioids.

Q. All right. Let's turn to Appendix III.G.1, and let's look at panel A. Go to Page 2. Let's start with Summit. And so we've moved on now to the medical examiner component of your harms analysis. Okay?

A. That's fine with me.

Q. Sounds good.

Okay. So to identify the total number of opioid-related overdoses, you say you looked at the medical examiner autopsies where opioids are identified in the cause of death or where drugs or substance abuse are identified in the cause of death and opioids are found in toxicology results.

Do you see that?

A. Yes, I do see that.

Q. So for autopsies where you consulted toxicology reports, what was your method of determining whether an opioid was found?

A. So I did not do these calculations. These calculations came from the medical examiner's office of Summit.

Q. So you didn't personally consult toxicology reports?

MR. SOBOL: Objection.

A. That's correct, I did not personally consult toxicology reports.

BY MR. KNAPP:

Q. And no one on your team, to your knowledge, consulted toxicology reports?

A. To my knowledge, no one on my team consulted toxicology reports.

Q. And do you know in the Summit County medical examiner data how autopsies are dealt with when there was more than one drug found in the toxicology report?

A. I don't know for certain. The wording identified in the cause of death suggests that that is any presence of opioids, but I would want to check that 100 percent before saying that definitively. I would want to check that before saying that definitively.

Q. So sitting here today, you can't say for certain whether the numbers in line 1, opioid-related overdose autopsies, are only those opioids where the -- where an opioid -- strike that.

Sitting here today, you can't say for certain whether the opioid-related overdose autopsies are limited to those autopsies where an opioid was identified as the cause of death?

MR. SOBOL: Objection. Asked and answered.

A. The words are total opioid -- total

number of medical examiner autopsies where opioids are identified in the cause of death. So assuming we wrote that correctly, that would be any case where opioids are identified in the cause of death.

BY MR. KNAPP:

Q. Then it goes on to say "or substance abuse" -- strike that, "or where drugs or substance abuse are identified in the cause of death and opioids are found in toxicology results."

Do you see that?

A. Yes, I do see that.

Q. And so that would indicate that if opioids were included in the toxicology reports along with methamphetamines and cocaine, you would include that as an overdose-related autopsy regardless of what was identified as the cause of death, correct?

MR. SOBOL: Objection.

A. In this circumstance, typically what this refers to is many medical examiners just write down "drug overdose" as a cause of death and without identifying a specific drug. So

what this -- so what I believe this is referring to is then going further and saying, okay, the death certificate may say that drug poisoning is the cause of death, what does the toxicology report say about the specific drugs.

BY MR. KNAPP:

Q. Understand that. And I'm trying to ask you about a situation where there's multiple drugs in the toxicology report.

My question is, if there is an opioid that was listed in the toxicology report but also other drugs, like cocaine and methamphetamine, as long as there was an opioid listed, you would count that as an opioid-related overdose autopsy, correct?

A. That's correct, that would count as an opioid-related autopsy.

Q. And you didn't make any adjustments to your data based upon the percentage or the volume of opioids found in a toxicology report compared to the volume of any other drugs that might have been found?

A. I did not make any adjustment for the volume of opioids relative to other types of

drugs, and I don't believe that the data when they were collected did any such adjustment.

Q. So if there was an overdose where there was ten times as much cocaine and methamphetamine found in someone's system as opioids, you would still count that as an opioid-related overdose autopsy, correct?

MR. SOBOL: Objection.

A. That's correct, that would be an opioid-related overdose death.

BY MR. KNAPP:

Q. Did you -- you say that you're relying on data provided by the medical examiner for your opioid-related overdose figures, right?

A. That's correct, these are data provided by the medical examiners.

Q. Did you speak with anyone in the medical examiner's office in Summit or Cuyahoga about their data?

A. I personally did not --

MR. SOBOL: Objection.

A. -- speak with anyone in the medical examiners' offices of either Cuyahoga or Summit.

BY MR. KNAPP:

Q. Did you speak with any -- or strike that.

Did you review any deposition transcripts from anyone from the medical examiners' offices of Summit or Cuyahoga who testified in this case?

A. I did not review any deposition transcripts from anyone from the medical examiners' offices.

Q. Do you know who Lisa Kohler is?

A. No, I do not know who Lisa Kohler is.

Q. Do you know who the Summit County medical examiner is?

A. No, I do not know who the Summit County medical examiner is.

Q. Okay. I'm going to hand you what's already been marked as Kohler Exhibit 1.

A. Can we -- can I -- I beg your pardon. Can I just take a quick break --

Q. Sure. Absolutely.

A. -- to use the restroom?

THE VIDEOGRAPHER: The time is 4:31 p.m., and we're off the record.

(Whereupon, a recess was taken.)

THE VIDEOGRAPHER: The time is 4:50 p.m., and we're on the record.

BY MR. KNAPP:

Q. So, Professor Cutler, I just handed you Kohler Exhibit 1. Before I get to that, I wanted to circle back on something.

We were talking about the SACWIS database, and you mentioned that you looked at it and that you couldn't use it for estimating the harms.

Do you recall that testimony?

A. Yes, I do.

Q. And when did you look at the SACWIS database?

A. I think it came up on several occasions. I think it came up early on as we were doing inventory of the various possible data sources, and then -- and so that would have obviously been one of the items in the inventory.

And then second is as we would walk through the various estimates we would examine them for reasonableness, and if I recall correctly, it came up there as well.

Q. And so when you say "it came up early on," do you mean that you got access to the SACWIS database early on in your retention?

A. Yes, I believe so, but I don't remember the exact date.

Q. It was sometime in 2018, fair to say?

A. I think it was in 2018.

Q. And when you say you got access to the SACWIS database, what do you mean by that?

A. We would have had the numbers that came -- the percentages that came from the SACWIS data, so not the raw data, but the tabulated percentages.

Q. And so what form did it come in?

A. I don't remember those data in specific in terms of what form they came in.

Q. But did you yourself, you personally look at the tabulated percentages from the SACWIS data?

A. I can't recall if I looked at it or if instead the folks at -- I know for sure the folks at Compass Lexecon had the data, and so they would have then presented it in terms of what we know from various data sources, and then

we would have discussed the different data sources, what they say, what we know about how they were done, and thoughts about accuracy and relevance and so on.

Q. Did you run any models based upon the percentages tabulated from the SACWIS data?

A. No, we did not run any models to estimate -- based on the percentages estimated from the SACWIS data.

Q. So you mentioned -- sorry. One second.

Okay. Let's go back to Kohler Exhibit 1. And just to re-orient ourselves, you don't know who Lisa Kohler is, right?

A. That is correct.

Q. Okay. I'll represent to you that she either is or was the Summit County medical examiner. Okay?

A. I will take your word for it then.

Q. And I can represent to you that Ms. Kohler testified that Kohler Exhibit 1 is a collection of overdose deaths that were processed by her department in calendar year 2015.

MR. SOBOL: Objection.

BY MR. KNAPP:

Q. So what I want to direct your attention to is if you look at the last page of this exhibit, do you see the total there is 213?

A. Yes, I see that total.

Q. And I will represent to you that Ms. Kohler testified that that represents the total number of drug-related overdose deaths in 2015. Okay?

MR. SOBOL: Objection.

A. Okay.

BY MR. KNAPP:

Q. Now, let's compare that to Appendix III.G.1.

Actually, before we get to III.G.1, you would agree that the number of opioid-related overdoses would be a subset of all drug overdoses, right?

MR. SOBOL: Objection.

A. Yes, opioid-related overdoses should be a subset of drug-related overdoses.

BY MR. KNAPP:

Q. Okay. And if you look at Appendix

III.G.1, panel A for Summit County --

A. III.G.1, Summit County. Okay.

Q. -- do you see that there are -- it's identified as 214 opioid-related overdose autopsies?

A. Yes, I see the 214 there.

Q. Do you have any way to explain how there could be 214 opioid-related overdose autopsies in 2015 in Summit County if there were only a total of 213 overdose deaths associated with all drugs?

MR. SOBOL: Objection.

A. I don't have an obvious answer. I would -- if asked to investigate this, I would investigate each data source and I would look and see what they're recording and who they were done by and then potentially go case by case. But I don't have a -- I don't have an estimate of the -- I don't have an explanation for the difference right at hand.

BY MR. KNAPP:

Q. So I also want to ask a -- well, strike that.

Ms. Kohler also testified that the

number of overdose deaths associated with opioids may be inflated because those figures include suicides. Are you familiar with that testimony?

A. No, I have not seen her testimony.

Q. Did you do anything to account for the possibility that suicides were reported in the number of opioid-related overdose autopsies?

MR. SOBOL: Objection.

You may answer.

A. No, we did not pull out suicides from here.

BY MR. KNAPP:

Q. Do you know what -- well, strike that.

Do you know what percentage of drug overdoses are actually suicide attempts?

A. No. And in general it's very difficult to separate out accidental drug deaths from drug suicides.

Q. And you haven't attempted to do that in connection with your analysis, correct?

A. No, I have not attempted to do that.

Q. Do you have an estimate based upon any literature that you've read or any studies that

you've done of the percentage of overdose deaths that are actually suicides?

A. I have not done any study of drug-related deaths and the percentage that would be suicide. I don't offhand recall having seen any literature on this. It's possible that literature exists, but I don't have it off the top of my head.

Q. I want to hand you what I'm marking as Cutler Exhibit 7.

(Whereupon, Cutler Exhibit Number 7 was marked for identification.)

BY MR. KNAPP:

Q. So Cutler Exhibit 7 is an article called "Suicide Emerges in Understanding the Opioid Epidemic" from January 9th of 2018, is that right?

A. Yes, it is.

Q. And if you turn to Page 6 of 10, do you see that you're quoted in this article, sir?

A. Yes, I do see that.

Q. Have you seen this article before?

A. Yes, I have seen the article before.

Q. Okay. So let's start on Page 4 of 10.

And if you go to the fourth paragraph from the bottom, it starts "For one thing."

Do you see that?

A. Yes, I do see that.

Q. Do you see "For one thing, medical examiners use different criteria for whether suicide was involved or not"?

Do you see that?

A. Yes, I do see that.

Q. Did you make adjustments to any of the analyses in your model for the differences in how medical examiners account for suicides?

MR. SOBOL: Objection.

A. I assume you're referring to this specific analysis in Appendix III.G. Is that -- I'm not allowed to ask a question?

BY MR. KNAPP:

Q. Let's start there and then we'll talk about your regressions after that.

A. Okay. In that analysis, we did not do any adjustment for people who committed suicide, nor do I necessarily think that it would be appropriate to do an adjustment for suicide.

Q. So let's then talk about your

regressions. Did you make any adjustments for the number of overdose deaths that are actually intentional suicides in running your regressions?

A. In the data appendix, we talk about the drug poisoning deaths, and I just want to -- I'd like to look at that specifically, because in that analysis what we do is we look at drug poisoning deaths which are separate -- what I'm trying to remember is whether that's separate from suicide or not, and I just want to refresh my memory on that.

Q. Okay. Why don't you take a look at it.

A. I don't have here a copy of the data appendix.

Q. I have my copy. Let me just check this. I'm going to hand you -- I'm not going to mark this as an exhibit, a copy of your data appendix (handing).

A. Thank you.

MR. SOBOL: He's just refreshing his recollection?

MR. KNAPP: Correct.

A. I just want to be sure -- I always want to be sure I give you the correct answer.

BY MR. KNAPP:

Q. I appreciate that.

(Witness reviewing document.)

A. So I feel embarrassed because I should remember this, and I don't. I don't -- and I don't see the exact wording here as to whether suicides are included or not in the drug overdose.

In general, I think that the distinction between suicide and accidental poisoning is not -- is a very fluid one, and I don't often -- I'm uneasy often about making the distinction between them.

BY MR. KNAPP:

Q. Let's go back, then, to Cutler Exhibit 7.

So two paragraphs down from where we just were, do you see it's in brackets, "based on the literature that's available," it looks like it's anywhere between 25 and 45 percent of deaths by overdose that may be actual suicides?

A. Yes, I do see that.

Q. So you didn't make any adjustments in your regressions for the 25 to 45 percent of deaths by overdose that may be actual suicides?

A. In the --

MR. SOBOL: Objection. Asked and answered.

A. You mean in the regressions that I do on the mortality?

BY MR. KNAPP:

Q. Correct.

A. Let me -- again, and I should remember and I don't, which I feel bad about, as to whether the suicides are included or not. Let me, however, make two comments.

The first comment is that as this article notes, and as many other article notes, the distinction between what's a suicide and what's an accidental poisoning is not always clear, and it often relies upon the medical examiner to determine intent, which is very difficult in -- for a medical examiner, obviously, because the patient is no longer alive. So it's very common for researchers to treat suicides and accidental poisonings in the

same bucket.

In addition, it is also the case that the availability of opioids may lead to additional suicides. We know from a lot of psychology literature that many suicides are impulsive, and so the availability of having the opioid around may be a factor that turns an individual who is experiencing pain, mental pain, into someone who commits suicide. And so just because something is a suicide does not mean that the availability of opioids were not involved, nor does it mean that if the opioids were not around the individual would have found a different way to commit suicide.

Q. Okay. And I know you've got some studies on that, so we're going to walk through those as well.

A. Very good.

Q. Let's move on in the article. The next paragraph says she, being Dr. Mary Oquendo, immediate past president of the American Psychiatric Association, she points to a study that prescription overdose -- opioid overdoses, and have found that 54 percent were

unintentional.

Do you see that?

A. Yes, I do see that.

Q. And the rest were either suicide or undetermined.

Do you see that?

A. Yes, I do see that.

Q. And I asked you about your regressions. But for purposes of your Table 3.8, you don't make any adjustments for the percentage of overdose deaths that are actually suicides?

MR. SOBOL: Objection. Asked and answered.

A. No. As I said, I think of the opioids as being something that may lead to a suicide death just as it may lead to an accidental drug poisoning death.

BY MR. KNAPP:

Q. So why don't we turn then to Page 6. Do you see at the top there there's a quote from, I believe it's Professor Deaton, "We think of opioids as something that's thrown petrol on the flame and made things infinitely worse, but

the underlying deep malaise would be there even without the opioids"?

Do you see that?

A. Yes, I do see that.

Q. And you're quoted below that as identifying some reasons for that deep malaise, right?

A. Yes, I am quoted that way.

Q. And those reasons include good education -- well, strike that. The lack of -- strike that.

MR. SOBOL: Strike that.

BY MR. KNAPP:

Q. The reasons you identify for the underlying deep malaise that may be responsible for these suicides include lack of a good education, lack of a steady job that pays a decent wage, lack of secure housing, food, and healthcare, is that right?

A. Yes, that is correct.

Q. Do you agree with Professor Deaton when he says that the underlying deep malaise would be there even without the opioids?

A. I believe that there is a lot of

malaise in many parts of the country that would remain even without opioids.

Q. And we'll talk about your regressions either later this evening or tomorrow, but did you control for -- do you believe you controlled for all of the factors that contribute to the deep malaise that would exist even without opioids?

MR. SOBOL: Objection to the form.

You can answer.

A. In my analysis I controlled for as many factors as we could possibly get any information on. So it's always possible that one would always want to include additional data if one had it, but we took account of everything that we could think of that would pick up the malaise.

BY MR. KNAPP:

Q. But you can't rule out that there are other factors that contribute to the malaise that you haven't controlled for in your regressions, correct?

MR. SOBOL: Objection.

A. There could be other factors, and so,

in part, that's one of the rationales for doing the direct model, which is that in the direct model we are taking all of the affect that -- or excuse me -- we are taking the affect that is only due to the shipments of opioids. So it's not saying whatever reason people were dying in Cuyahoga or Summit, those are deaths that are attributable to a particular cause, it's sort of saying take only those parts that are related to the shipments of opioids. Of course that will yield a lower bound because there's measurement error in the shipments to the area. It's not perfectly associated with consumption and so on, so that's why we supplement that also with the indirect model where, again, we try to control for as many demographic economic social factors as we possibly can.

Q. And to the extent -- strike that.

With respect to your indirect model, to the extent that you haven't controlled for any factors that contribute to the deep malaise that you agree exists within society, you've attributed the harms associated with those factors to the defendants, correct?

A. That's actually --

MR. SOBOL: Objection.

A. That's actually not correct. Any other factor that's not included that's correlated with the things that are included will be picked up by what's included. So, for example, we include education, and we include employment, and employment shares, and age and so on. Anything about an area that we cannot measure but that is associated with population change and employment and the age distribution and the education distribution, those will be picked up by those coefficients.

So the only thing that would affect the model is anything having to do with malaise that is completely uncorrelated with everything else that is in the regression.

BY MR. KNAPP:

Q. But you haven't been able to test any of those other factors to determine if they are correlated with the factors that you did include in your indirect regression, right?

MR. SOBOL: Objection.

A. In general, if I had more data, I

would always include them. In this case, I have quite a lot of variables in the regression, so I'm less worried about it than in situations where I don't have as many.

But in answer to the question as a researcher would one value having additional data -- additional variables to look at, the answer is yes, always one would value additional data to look at.

BY MR. KNAPP:

Q. Okay. Let's go back to Cutler Exhibit 7. I'm on Page 5 of 10. One, two, three, four, five paragraphs down, do you see there's a quote there, "No one has answered the chicken and egg question." And it goes on to say, "Is it that patients have mental health issues that lead to addiction, or did a life of addiction then trigger mental health problems?"

Do you see that?

A. Yes, I do see that.

Q. And you haven't solved that chicken or egg problem, have you?

MR. SOBOL: Which? Well, then objection.

BY MR. KNAPP:

Q. You can answer the question.

MR. SOBOL: Objection to the form then.

A. We are not -- we -- in the models that I developed, we have not answered those questions, but we also do not need to answer those questions. So we are taking the relationship between the shipments and the mortality in the direct models and using that to develop an estimate of the impact of opioids, and therefore as a result we do not -- because we have that variable we can look at, we don't need to develop a model that says either addiction results from mental health issues or that mental health issues result from addiction. So that's one of the advantages of that problem is that you don't need to solve this.

BY MR. KNAPP:

Q. Well, with respect to Table 3.8 --

A. I'm sorry. Table?

Q. 3.8 at Page 28 of your report.

A. Mm-hmm.

Q. If you haven't made any adjustments to

the opioid-related autopsy figures for suicides, isn't it the case that you are necessarily attributing some suicide deaths to the actions of the defendants here?

MR. SOBOL: Objection to the form. You may answer.

A. It is, and I believe that that's an appropriate thing to do.

BY MR. KNAPP:

Q. And that's because you're making an assumption that these suicide deaths were triggered by opioid shipments, is that right?

MR. SOBOL: Objection.

A. I'm making the assumption that the opioid shipments were, through any number of reasons, were one of the factors that might have led an individual to commit suicide and/or increased the propensity of people in severe mental despair, the rapidity with which they could commit suicide and, therefore, the impact of mental anguish on suicide.

BY MR. KNAPP:

Q. So aren't you necessarily making a judgment about this chicken or egg problem in

assuming that for some percentage of suicides the issue was caused by opioids as opposed to mental illness?

MR. SOBOL: Objection to the form. You can answer.

A. In this specific case, these numbers do include suicide, and so they are assuming -- they're just -- I mean, what they are is a statement about the activity of the medical examiner, and so it's saying that the activity of the medical examiner is driven by the opioid -- by the suicides, including those that involve opioids. So here those deaths are being included.

In the regression model, which also examines mortality, it's not making any specific assumption that those deaths would not have other -- would not have otherwise occurred in the absence of the opioids.

BY MR. KNAPP:

Q. And to come up with your ultimate share of harms attributable to the defendants for medical examiner harms, you multiple these percentages in Table 3.8 by the results of your

regression and by the results of Dr. Rosenthal's analysis, right?

A. Yes, that is correct.

Q. And so it's necessarily the case that some of the suicides end up in the percentage of harms that you're attributing to the defendants, correct?

MR. SOBOL: Objection. Asked and answered.

A. Yes, that is correct.

BY MR. KNAPP:

Q. So on the -- sorry. Bear with me one second.

So going back to the concept of the deep malaise that was referenced in Cutler Exhibit 7, why didn't you try to estimate a malaise variable in your regressions, those deaths that are non-opioid-related deaths of despair?

MR. SOBOL: Objection. Asked and answered.

A. So first off, deep malaise was not my term, I would have used a different terminology for it, but that's obviously the term that

Professor Deaton finds. I believe that I have included many, many variables that reflect the "deep malaise" or the difficulty that people are feeling associated with economic conditions, social conditions, demographic conditions. Quite a large number of them are in the models that we estimate.

BY MR. KNAPP:

Q. And those are the demographic and economic control variables that are described in your report?

A. That's correct, they include the demographic, the social, the economic variables that are described in the report.

Q. Okay. I'm handing you what's been marked as Cutler Exhibit 8 (handing).

(Whereupon, Cutler Exhibit Number 8 was marked for identification.)

BY MR. KNAPP:

Q. This is an article that you co-authored explaining the rise in youth suicide, right?

A. Yes, that is correct.

Q. And one of the things that you were attempting to analyze in connection with this paper is what is -- what was contributing to a rise in youth suicides in different areas in the -- I believe it's the 1990s?

A. Yes, that is correct. We actually have long-term data in here.

Q. I want to look at Page 22. And you see at the top of the second full paragraph on Page 22 it says, "A clear issue with these variables is the endogeneity problem. Children who take drugs more, for example, may be more likely to attempt suicide for other reasons. Without instruments for these teen activities, we cannot resolve the causality question. We thus primarily think of these regressions as correlations more than a strict theory of causation."

Do you see that?

A. Yes, I do see that.

Q. What is the endogeneity problem you're identifying there?

A. The endogeneity problem, I want to just remind myself of exactly which regression

equation I'm -- we are discussing there, so give me just one second to look at that, if you would, please.

(Witness reviewing document.)

A. Yeah. So these are data from the AD health survey, and so -- excuse me. So the dependent variable that we're looking at is in this case self-reports of suicide attempts, and then we're relating that to a number of other characteristics of the child and the child's family and the area of the child and so forth.

And so the endogeneity problem in general refers to that a particular variable may not be definitive on its own, but may be picking up something about the individual.

So the specific example here might be someone who takes drugs. It will look like drugs are harmful, but that may just be picking up something else about the individual, and therefore you would be overestimating the impact of any particular -- of any particular thing like taking drugs or going to church or whatever it is on suicide attempts.

BY MR. KNAPP:

Q. How did you do with -- deal with the endogeneity problem in connection with the regression models you ran in this case?

A. The -- so first off, these regression models we ran here are not at the individual level, they're at the area level, so there's less of an issue with looking at a particular individual who takes drugs and then dies as opposed to looking at the area level.

But another answer to -- so that's one answer, is that at the area level these issues are different than they are at the individual level.

Another answer is that the results here are relating the shipments to the harms and, if you will, the instrumental variable that we're talking about, to put it in that language, the instrumental variable that we're talking about is the result from Professor Rosenthal's research, which is the share of shipments which are due to misconduct on the part of the defendants.

So we have a measure here which is not just -- which is not related to, for example,

whether an individual was particularly seeking out medications, but are -- but is directly related to the misconduct at issue, and so that provides the causal chain from the defendants' misconduct to the harms, whereas in the paper that you referenced we did not have that causality associated with the individual taking drugs.

Q. And so it's your view that you didn't need to make any adjustments to the mortality data that was included in your report to deal with this endogeneity problem, you believe it was all resolved through Dr. Rosenthal's attribution of shipments to defendants' misconduct, is that right?

MR. SOBOL: Objection.

A. It was resolved in a few ways. One was by using data at the area level rather than at the individual level. And second, it was resolved by using Dr. Rosenthal's estimates of the shipments that are due to the misconduct of the defendants.

BY MR. KNAPP:

Q. How does Dr. Rosenthal's

identification of shipments that she attributes to the defendants tell you whether someone who committed suicide had other mental illness factors that would cause them to commit suicide as opposed to, you know, the opioids being the cause of the suicide?

A. Dr. Rosenthal's analysis doesn't directly assess that. That comes out of the models that I do.

So let's say it were the case, for example, that the people who are taking opioids and dying of opioids would have in the absence of opioids taken cocaine and died of cocaine. Then when I relate in my -- in the models that I estimate, when I relate death rates from drug overdoses to opioid shipments, I would find no impact, or when I relate -- when I relate crime to shipments of opioids I'd find no impact, because in the hypothetical that you gave it's all just a substitution from one to the other, and so, therefore, the shipments of opioids to an area would not be related to any measurable harm.

Q. That answer that you just gave, that

relies on the assumption that you have included all the variables in your report that would explain why somebody might commit suicide, right?

MR. SOBOL: Objection.

A. No, actually not. If all there was was a substitution from suicide to accidental poisoning, then a combined measure of mortality that included them both would not be related to drug shipments at all, provided one were looking at all the causes of death.

So it's -- so a substitution from A to B wouldn't affect the estimates if you're looking at the total of A and B together.

BY MR. KNAPP:

Q. If we look back at Page 3 of Cutler Exhibit 8, do you see that there's a comment there that says "In addition to these general social stresses, there had been a concurrent drug epidemic that may have been intimately related to the suicide epidemic." Then it goes on to say "A nationwide decrease in the price of heroin resulted in an increase in heroin use by even very young adolescents in South Boston in

1995 and 1996."

Do you see that?

A. Yes, I do see that.

Q. You opined or you wrote that there was a heroin -- strike that.

You wrote that there was a drug epidemic in 1995 and 1996 in South Boston that included the use of heroin, right?

MR. SOBOL: Objection.

A. It was terrible. Yes, there was.

BY MR. KNAPP:

Q. And you attributed one of the -- strike that.

You identified one of the reasons for the epidemic was a decrease in the price of heroin.

Do you see that?

A. Yes, that's correct.

Q. And you understand that there was generally a decrease in the price of heroin in the United States in the 2010s, right?

A. Yes, that's correct, there was a decrease in the price of heroin.

Q. And you haven't controlled for the

decrease in the price of heroin in connection with your regression models, correct?

A. Actually, I don't think that it would be appropriate to control for the price of heroin in those models.

Q. So the answer is you haven't done it?

MR. SOBOL: Objection. Asked and answered.

A. I haven't done it because it wouldn't be appropriate to do so.

BY MR. KNAPP:

Q. And you haven't attributed any of the harms that you identify as resulting from the opioid epidemic to the decrease in prices associated with heroin, right?

A. The decrease in prices associated with heroin to a great extent are because the markets for heroin got to be what economists called thick markets, which is more people on the -- more people on the supply side, more people on the demand side.

The reason they got to be so thick -- the reasons the markets got to be so thick is because there were so many people that had been

addicted to opioids, and then when the opioid supply was reduced they went to look for other alternatives, and heroin was a cheaper other alternative. So that led more people into the market. As a result of more people being in the market, there were more sellers, there were more buyers, and in thick markets like that prices tend to fall.

I think that the reduction in heroin prices and the increase in heroin use are a result of the factors associated with the opioid -- legal opioid epidemic, and they are not some exogenous change that just happened to occur.

Q. What analysis did you do to support the statement you just made that the fact that there were, quote, so many people addicted to opioids created the thicker markets?

A. If you look in the report, there are several different pieces of evidence. One piece of evidence comes from the test for the structural breaks.

MR. SOBOL: Pages?

A. I'm sorry. Pages 33 and 34, Figure

3.2 and 3.3. What those figures show is that the transition from deaths which were largely due to legal opioids to deaths which were due -- largely due to illegal opioids, that happened very suddenly in 2010. That's, of course, exactly around the time formulation of -- the time of the reformulation of OxyContin to abuse-deterrent formulation, and reflects the fact that people were moving into markets for illegal opioids as their preferred legal opioids became more difficult to obtain. So that's one piece of evidence that suggests that -- that is consistent with the thickening of the markets.

A second piece of evidence comes from Figure 3.4 on Page 35 of the report. What that figure shows you, the red line is the heroin mortality rate for the counties in the sample that I analyze that had high shipments. Those counties always had a little bit higher heroin mortality rate prior to 2010, but in those areas where there were more people taking prescription -- excuse me -- more people who were -- more -- where there were more shipments of prescription opioids, those areas had a particularly large

increase in heroin mortality relative to other areas that had lower shipments again associated -- consistent with the creation of thicker markets in areas where legal opioids were more prevalent. So that's the second piece of evidence.

The third piece of evidence comes from the literature of other economists that have looked at the transition in opioid-related deaths from legal opioids to illegal opioids. Think about in particular two specific studies which I'll just cite because we note them in the report, the studies of Alpert, et al, and the study of Evans, et al, both of which examined the transition from legal opioids to illegal opioids associated with supply side changes, and both show very large substitution consistent with people moving in and creating a thick market.

And then finally I cite numerous studies of sort of anthropological studies or epidemiological studies of people who were abusing illegal opioids, particularly heroin, after 2010, and many of the people in those

studies started on prescription medications and transitioned to heroin over time and helped to create a thicker market there. So I believe there -- there's quite a lot of evidence in support of that.

BY MR. KNAPP:

Q. Okay. Let's -- there was a lot there, so we're going to unpack that, okay?

A. Very good.

Q. Let's start at Paragraph 48, because I think that's where this analysis starts. And what you're talking about in Paragraph 48 is why you ran two different regression frameworks to estimate the impact of shipments on opioid mortality, right?

A. Yes, that is correct.

Q. And what you say is it's due in part to data limitations. Okay? Is that right?

A. Yes. I can't remember if that said so specifically in this paragraph or elsewhere, but yes, I do say that it's due to data limitation.

Q. And so what are the data limitations that you're referring to there?

A. Let me just look at this specific

paragraph just to remind myself of exactly what is in this paragraph.

Q. It's in the first sentence.

A. Thank you, sir.

Yes. Okay. The specific data limitation that I'm referring to is if you want to relate mortality to use of opioids or consumption of opioids, which is what one really wants, you need data on consumption of opioids over the time period for which you want to relate it to mortality.

We have a proxy for consumption of opioids up to and including 2010. That proxy is the shipments of opioids to the area. So that proxy is not perfect, but it's a reasonably good proxy for consumption of opioids would be shipment of opioids.

After 2010, if one wanted to do the analogous type of regression, one would need data on consumption of illegal opioids across areas. The primary data limitation that's referenced here is that we don't have the data on consumption of illegal opioids, because by definition they're illegal so they're not

gathered, and so, therefore, I cannot estimate a model that goes past 2010. It would not be economically appropriate to estimate a model that goes past 2010 because I don't have the key independent variable.

Q. And the basis for your statement that it would not be economically appropriate to estimate a model that goes past 2010 is based upon your conclusion that there was this break in 2010 that shifted the relationship between shipments and mortality, right?

A. That's a part of it. So first is there's a break in 2010, a very clear break in 2010 where it's clear that there's a different source of mortality that is occurring with increasing frequency after 2010, and coupled with I do not have the data on consumption of total opioids, not just legal opioids, but illicit opioids as well. I do not have data on consumption of opioids in each area past 2010.

Q. And it's the case that you don't have data on consumption of illegal opioids for any period, right, not just post 2010?

A. That's correct, I don't have data on

consumption of illegal -- of legal opioids for any time period, but I have what I believe is a very good proxy, which is shipments of opioids to the area.

Q. And so it's your opinion that after 2010 a direct model would not support your conclusion that shipments drive mortality, right?

MR. SOBOL: Objection.

A. That is not my conclusion.

BY MR. KNAPP:

Q. Well, so what you found is that after 2010 the -- there was a decrease in shipments that's correlated with an increase in mortality, right?

A. That is correct, after 2010 there's a decrease in shipments of legal opioids and an increase in deaths due to opioids largely due to illegal opioids.

Q. And so if you ran a direct model after 2010, it would not be consistent with the results of your direct model prior to 2010, right?

A. It would not be appropriate to

estimate a direct model after 2010.

Q. And it would not be -- if you did, it would not be consistent with your pre-2010 results, correct?

A. I cannot actually do it because I don't have the data. I would -- in order to estimate the equivalent model, I would need the data on, if you will, total shipments of legal and illegal opioids to an area after 2010. I don't have the data. If I had that data, it would be totally appropriate to estimate a model after 2010 for mortality or mortality changes as a function of shipments of both legal and illegal opioids to the area after 2010. I don't have that data.

In the absence of not -- when you are not able to form the key independent variable, you -- economically you just cannot estimate that model. You'd like to do it, but you just can't do it.

Q. But you ran a model prior to 2010 that you believe you are comfortable -- strike that.

You ran a model prior to 2010 that was based on shipments of just licit opioids,

correct?

MR. SOBOL: Objection.

A. That's correct, because prior to 2010, essentially all of the use of opioids was use of legal opioids, so therefore the key independent variable, which is the shipments of legal opioids to an area, is a very good proxy for the total use of opioids in that area.

BY MR. KNAPP:

Q. So you did not attempt to run a direct model after 2010 that was just based upon shipments of prescription medicines?

MR. SOBOL: Objection. Asked and answered.

A. It wouldn't be appropriate to run a model --

BY MR. KNAPP:

Q. I'm not asking if it's appropriate. I'm just asking did you do it.

MR. SOBOL: Objection. Asked and answered twice.

A. I think I'm just going to say it would not be appropriate to do it. It would not be an informative model.

BY MR. KNAPP:

Q. Would it be truthful to say that you ran a direct regression after 2010 based upon just shipments of prescription medicines?

MR. SOBOL: Objection. Asked and answered several times.

A. I'm just going to say that it would not be an appropriate model to estimate.

BY MR. KNAPP:

Q. Would it be truthful to say that you ran a regression after 2010 based upon only licit opioid shipments?

A. That's -- it's just -- my job is to help with the best models, and that is not an appropriate model to estimate.

Q. I'm not asking if it's appropriate. I'm just asking if you did it.

MR. SOBOL: Objection. Asked and answered.

MR. KNAPP: It is -- the answers are non-responsive.

MR. SOBOL: Objection. Asked and answered several times.

A. I'm going to repeat the answer, which

is that it would not be an appropriate model to look at.

BY MR. KNAPP;

Q. I'm going to ask you one more time. Is it truthful or not -- you're here to tell the truth. Is it truthful to say that you ran a direct model after 2010 based only on prescription opioid shipments?

A. And I'm going to repeat that it's just not an appropriate model to look at.

Q. Did you look at it?

A. It's not an appropriate model to look at. It is not in the report. I do not rely on it in reaching any conclusions.

Q. Did Compass Lexecon run a direct model based upon licit opioid shipments after 2010?

A. The conclusions that I reach in the report are based on the models that are here. I believe that the models that are here are the appropriate ones to estimate.

Q. Let's go to Paragraph 17. So in Paragraph 17 you say "Available evidence indicates" -- well, let me get there. "Available evidence indicates that licit and

illicit opioids are to some degree substitutes."

Do you see that?

A. Yes, I do see that.

Q. What do you mean by "substitutes"?

A. In economic terms, a substitute is when you consider two goods, and the question is when the price of one goes up what happens to consumption of the other. So if the price of, say, legal opioids goes up because they're more difficult to obtain or insurance is not covering them as much or you have to make more doctors' visits and pay more in co-pays, then any -- then a complement is a good -- so when the price of prescription opioids goes up, people consume less of that good.

A complement is when people consume less of another related good. A substitute is when someone consumes more of another related good. In this case, the substitution is from the legal opioids which got more difficult both in time and money to obtain, and the substitution increased use of the other good, in this case illegal opioids.

Q. So you talked about the price of legal

opioid goes up, legal opioids goes up because they're more difficult to obtain. In typical substitutes, if the price of one good goes up, would you expect that the price of the substitute would go up as well, or would you expect it to go down, stay the same?

A. The price of the substitute good might go up or it might go down or it might stay the same. It depends a lot on the supply conditions in the substitute market. If, for example, marginal cost is increasing, that is, you have to use more and more resources to get into that other market, then you would expect that the price of that other good would go up. If the other good is sort of what the economists call perfectly elastically supplied, that is, you can get as much of it as you want at whatever the going price is, you would expect its price not to change.

If there are sort of fixed costs, that is, it takes some cost to get into business, but once the market is there then you can produce it more cheaply and more people buy it and so the price can fall, then you would expect the price

to decline.

So the theory, economic theory does not give any specific prediction about the price of a substitute good.

Q. So going further in Paragraph 17, you say "The analysis thus needs to explicitly consider harms due to any use of illicit opioids that resulted from defendants' actions along with harms due to licit opioids."

Do you see that?

A. Yes, I do see that.

Q. And is it fair to say that your model attributes to defendants the harms that you identify as resulting from the public and private interventions that decrease the availability of some licit opioid products?

A. No, I don't think that's -- excuse me. Can you just restate the question? I'm sorry. I just missed the last part of the question. I apologize.

Q. Let me limit this question just to the indirect models that you ran.

Is it fair to say that your model attributes to defendants the harms that you

identify as resulting from the public and private interventions that decrease the availability of some licit opioid products?

A. I have two responses to give. One is that the -- it doesn't attribute to any specific party or parties, so there's nothing that gets pulled out that says this is -- this gets attributable to this party and this gets attributable to this party.

But second, I think that it's -- economically, I think it's very difficult to start the movie in 2010 because those actions were undertaken with respect to market conditions and those market conditions were enormous of use and harms resulting from opioids. And so those actions then were taken by those agencies to try and stem the opioid epidemic, and they were not sort of out of the blue actions that one typically evaluates in an economic context to say, well, did this government policy designed to do X result in X or in some unintended effect. I think the story is actually more complex here.

Q. My question was narrower than that.

My question was, your indirect model attributes to defendants any of the harms that resulted from the public and private interventions that decreased the availability of some licit opioid products after 2010, correct?

MR. SOBOL: Objection.

A. What the indirect model does is it says let's estimate all of the deaths that are a result -- that we cannot otherwise explain with social and demographic and economic change. It then -- so it has that. It then applies to that the estimates -- in order to calculate the harms, it then applies to that the estimates of Professor Rosenthal on the components that are due to the defendants' misconduct. But as I estimate it, I don't have any controls for any actions that any agencies or organizations took.

BY MR. KNAPP:

Q. All right. So turning then to Paragraph 18, I want to focus on the last sentence of Paragraph 18. Well, actually, let's go up a sentence before that. It says, "The policy response to these problems played out on a number of levels, including federal, state and

local policy changes by private and public insurers, recommendations and restrictions implemented by medical societies and healthcare organizations, and changes by pharmaceutical companies."

Then you say, "Together these various policies contributed to the increased use of illicit opioids and further harms."

Do you see that?

A. Yes, I do see that.

Q. So you've identified here certain public and private policy restrictions that increased the harms that you're analyzing, right?

A. Yes, that is correct.

Q. And then you go on to say, "none of which would have been expected to occur in the absence of defendants' actions."

What's the basis for that statement, sir?

A. The increase in opioid shipments and harms in particular that occurred because of shipments are, as the report shows, a direct result of the misconduct on the part of the

defendants. Therefore, without the misconduct and thus without those harms, there would have been no reason for any policy change to have been undertaken, and therefore those policy changes would not have had any impact on the furtherance of the opioid epidemic.

Q. So in your model, you're not modeling that opioids disappear -- strike that.

In your model, you're not assuming that opioids disappear from the United States at any period of time, right? There's still a volume of opioids that you assume would have been shipped in your but-for model, right?

MR. SOBOL: Objection.

A. That is correct, in the but-for model there is an existing -- there are some opioid shipments that occur even in the but-for model.

BY MR. KNAPP:

Q. And those opioid shipments would have risks of abuse or addiction, right?

A. That's correct, those shipments do have risk of abuse and addiction.

Q. And so if there's opioids even in your but-for model that have a risk of abuse or

addiction, how can you say with any degree of confidence that these public and private policy interventions would not have happened?

A. I don't -- I think the counterfactual may be a bit strong here, and I shouldn't be in the business of trying to forecast what would have happened in the world in the absence -- in the but-for world.

I think what's more accurate to say is that in the end we relate these harms to the percentage of shipments related to misconduct, and so that's the quantitative estimate, and I think that's more precise.

Q. So let me try to be precise.

When you say the counterfactual is a bit strong, you mean the statement here that none of which would have been expected to occur in the absence of defendants' actions, you think that's a bit of an aggressive statement?

A. I think that that's probably stronger than I would -- than I think may be appropriate.

Q. Let's look at Figure 3.1 on Page 10. Do you see there's a box for defendants' misconduct, then we have an arrow to excessive

shipments, then an arrow down to harms incurred, and there's a line -- or a box there that says "Direct pathway"? Do you see that?

A. Yes, I do see that.

Q. What do you mean by "direct pathway"?

A. By direct pathway I'm referring to what we analyze in the direct model.

Q. So this direct pathway only relates to pre-2011 harms?

A. That's correct. That's the harms that result directly from the excessive shipments before there is any, then, activity that occurs post 2010.

Q. Your pre-2010 model models mortality based upon both licit and illicit opioids, correct?

A. That's correct, it is both licit and illicit opioids.

Q. And so you don't have a box -- why don't you have a box for use of illicit opioids in the direct pathway part of this diagram like you do in the bottom where you're referring to the indirect pathway?

A. There was some death from illicit

opioids, particularly as it relates to the period just before 2010 when one started to see some substitution into heroin even then.

The -- what I was trying to get at here is that I can estimate that directly because I have what I think is the key input here, which is the vast bulk of the use of opioids was related to the shipments of legal opioids.

And so I don't -- so what I really wanted to demonstrate in this figure is where I have data that I believe are appropriate to analyze the model and where I don't have the data that I would need to analyze the model, and so that's what I'm trying to get with this distinction here.

Q. Okay. So looking at Figure 3.1, the restrictive policies that you identify are abuse-deterrent reformulations, prescription drug monitoring programs, reductions in prescribing sales. Are there any other restrictive policies that you considered as contributing to the use of illicit opioids after 2010?

A. Two answers to that.

Number one is some of these specific lines have more things in them than just those words. For example, reductions in prescription sales are because of actions by insurance companies, public and private, actions of medical associations to recommend against using opioids, a variety of different things like that, so that's -- there are more things buried there.

But second, I didn't feel the need to flesh them all out because in the end I don't -- I don't -- I can't estimate a direct model after 2010, and so it didn't seem like I needed to enumerate specifically each of the reasons why as opposed to providing several of the reasons why the market changed in the way that it did.

Q. And to be clear, regardless of what the policies were that resulted in increased use of illicit opioids after 2010, your indirect model attributes all of the harm associated with those reductions to the defendants, correct?

A. No. It attributes the harm that cannot be explained by other social demographic

economic changes.

Q. So in your report you discuss only the reformulation of OxyContin. What other drugs were at issue when you referenced abuse-deterrent reformulations?

A. OxyContin is the one that the literature has studied the most, so it's the one for which there's the clearest evidence of the impact of reformulation on use of illegal opioids.

Q. I know. I'm asking you, what other reformulations did you consider?

A. I didn't need to make a list of all the reformulations because I was not -- I concluded that there was just no way I could estimate a model for post 2010, so I did not make a list of all of the abuse-deterrent reformulations.

Q. Well, do you know if there were any abuse-deterrent reformulations prior to the reformulation of OxyContin in December of 2010?

A. I believe December of 2010 was not the correct date for the reformulation of OxyContin.

Q. I guess I'm thinking of your

structural break, the point that you identified. Do you know when the reformulation of OxyContin was?

A. If I recall correctly, the abuse-deterrent formulation of OxyContin was in August of 2010 that it first started being shipped.

Q. Right. That's where Professor Rosenthal identifies the break in the market, right?

A. That is correct.

Q. Do you know if there were any abuse-deterrent reformulations prior to that?

A. None are coming to my mind right away, no.

Q. So we've talked a little bit about the Evans article from 2019, and that article states that "There was not a change to the opioid market more generally. The shock was specific to oxycodone and heroin."

Do you agree with that statement?

A. The events that he's looking at are the specific reformulation of OxyContin, and he's looking at a very specific time period

where that was the major event that was going on.

Q. Do you agree in that time period, August of 2010, that there was not a change to the opioid market more generally, and that it was specific to oxycodone and heroin?

MR. SOBOL: Objection.

A. I don't know with absolute certainty that there weren't, for example, insurers that put in restrictions on use of opioids around that time period, so I haven't done the research on every single action that might be taken by an insurance company or by a state government, and that would obviously influence people in those areas.

MR. KNAPP: So just to clarify, the videographer just identified that we're at seven hours at this point. I think it makes sense, given tomorrow is a Saturday, let's kind of take this as far as we can get and that everyone is comfortable with, as long as the witness is comfortable.

MR. SOBOL: Why don't we go to 6:30 and check it out then.

MR. KNAPP: See how everyone feels?

Okay. I think to the extent we can have a shorter day tomorrow, I think people will prefer that, but let's keep going for 20 minutes and we'll see where we're at.

MR. KO: I concur. Let's go until midnight.

BY MR. KNAPP:

Q. Okay. So I want to talk to you a little bit about the gateway theory.

You're familiar with the gateway theory, right?

A. Yes, I am familiar with it.

Q. And is that something that you separately opine on in this case?

A. No, I have not opined upon specifically the gateway theory.

Q. Okay. You understand that other plaintiffs' experts have opined on that, right?

A. I don't know which experts specifically you're referring to.

Q. Are you aware of any experts that opined on the gateway theory? Do you rely on any experts that opined on the gateway theory?

MR. SOBOL: Objection. Compound.

You may answer.

BY MR. KNAPP:

Q. Let me rephrase it.

Did you rely on any experts that opined on the gateway theory?

A. In this specific instance, no. To the best of my recollection, none of the articles relied upon here rely upon the gateway theory.

Q. When you say "none of the articles relied upon here rely upon the gateway theory," does that mean that you also do not rely upon the gateway theory?

A. I think it would help if you can go back and give me what you want -- what your definition of the gateway theory is so that I can then answer directly.

Q. Well, why don't I ask you the question.

What is your understanding of the gateway theory?

A. The gateway theory is that one drug serves as -- one substance serves as a gateway to another substance. So the most common way

this is told is about teens and, for example, smoking, so that teens may start smoking and then that may then lead them into other typically illegal and more dangerous drugs like marijuana or cocaine or opioids or anything else.

Q. With that understanding, are you relying on the gateway theory for any of the opinions you offer in this case?

A. No, I'm not relying on the gateway theory.

Q. Okay. So after 2010, you believe that the opioid crisis became an illegal opioid crisis, right?

A. It became to a significant extent an illegal opioid crisis. It was not exclusively an illegal opioid crisis.

Q. But there was a shift to substantially more of the deaths were associated with illegal opioids, right?

A. That is correct, there was a shift, and substantially more of the deaths were a result of illicit opioids.

Q. And what you've done in your report is

you've tried to identify a precise date at which there was the shift in the opioid crisis, right?

A. We've tried to identify -- I've tried to identify a date at which I think it's appropriate to relate death to shipments directly, and a point after which it's inappropriate to relate deaths to shipments of legal opioids.

Q. And did you consider whether the shift in the market or a shift in the crisis from a licit opioid crisis to an illicit opioid crisis was actually a gradual shift as opposed to an abrupt shift in December of 2010?

MR. SOBOL: Objection.

A. Yes, I did consider that.

BY MR. KNAPP;

Q. And you've rejected that possibility?

A. Let me refer you to Figures 3.2 and 3.3 on Pages 33 and 34 of the report, specifically Figure 3.2 which I think is most helpful for this question.

What this figure shows is it is at each date if you ask the data to determine whether there was a structural change in the

relationship between heroin -- the trend in heroin mortality over time and a jump in the level with what confidence would it -- would the data conclude that there was a break at that time. What you can see is that the data cluster very, very strongly, if you look at the dashed line, which is the F statistic for the test for the break in the trend, the data cluster very strongly at 2010.

So it's not suggesting a very spread out range where it's uncertain and maybe the shift happened at an earlier date or maybe it happened at a later date. The data are very clear that around that date is when it believes there was a structural change.

MR. SOBOL: The record reflect -- can you show into the camera where you were circling for the jury, please?

A. Yes. I was circling right here where the data are very clear that the break is happening here.

And if you go just a little bit before and a little bit after, it very strongly rejects that that's the point where the break occurs.

It really wants to focus on the data in 2010.

BY MR. KNAPP:

Q. Well, you say "the data in 2010." Are you -- does it focus on December of 2010, or does it focus on 2010 generally?

A. In general, it's relatively flat around many of the months in 2010, so the data have a hard time saying is the shift exactly in August or is it in July or whenever. There's a few -- it doesn't pin it down specifically to one month as opposed to a few months around that point in time.

Q. Well, if you had concluded that the break was earlier in 2010, you would have begun applying your indirect regression at an earlier period of time, is that right?

A. That's correct. If, for example, I had concluded that the break was in 2009, then I would have estimated the direct model only through, for example, 2009.

Q. Well, if the break was somewhere in the middle of 2010, would you have had to split your model for the year 2010 between direct through the first half of 2010 and indirect for

the second half of 2010 and going forward?

A. If one had the ability to do it, it would -- you know, the ideal model would be able to work off daily data. But in this case we were restricted to being able to do it annually, and so 2010 seemed like the natural break point from this.

Q. When you say you were restricted to doing it annually, is that because of limitations in the ARCOS data, or limitations in the mortality data, or something else?

A. In the -- I want to check to be sure. I think, if I recall correctly, the ARCOS data at the three digit ZIP are only available annually. I don't think I have those data at any higher frequency. I would want to be 100 percent certain before answering that definitively.

Q. So just to be clear, is your opinion that the break here occurred in December of 2010, or that it occurred at some point in 2010?

A. The evidence suggests that it occurred at some point in 2010, but cannot definitively say one month is obviously a superior break than

another.

There's also, of course, the papers by Evans, et al and Alpert, et al, that they looked very specifically around August of 2010 with the reformulation of OxyContin, so those papers also influenced my thoughts as to the appropriate break point, and in their case it was August of 2010. And so more of the year 2010 was in the pre-reformulation time period than the post reformulation time period.

Q. Did you do any analysis of whether the population of people who overdosed on illicit opioids after 2010 first became addicted to prescription opioids prior to 2010, any data analysis?

A. I did not do data analysis on when the people who overdosed after 2010 started using opioids.

Q. And so you don't know if a particular overdose after 2010 was an overdose of someone who had become addicted prior to 2010?

A. That's correct, I did not do any analysis at any individual level to say whether a particular -- how long a particular individual

had been addicted before he or she died.

Q. And you didn't do any demographic analysis at a more macro level to identify whether the population of addicts prior to 2010 matched up with the population of overdose victims after 2010?

A. There are several pieces of data that point to that. First is Figure 3.4 which is on Page 35 of the report. Figure 3.4 shows that the share -- shows that the increase in the overdose rate after 2010 was significantly greater in areas where there were greater shipments of opioids prior to 2010.

And then in addition the paper by -- I believe it's the paper by Alpert, et al shows that the shipments of opioids to areas in the 2000s is related to the share of people who have substance use -- who report substance use disorder using the NISD data, and so, therefore, from that it's -- those two correlations imply that areas where more people are addicted to opioids prior to 2010 are areas with greater increases in mortality after 2010.

Q. So I understand you've got the

correlation analysis here, but my question is, did you look at any demographic statistics or characteristics of individuals who overdosed after 2010 and compare them to the characteristics of people who were prescribed and became addicted to prescription opioids prior to 2010?

MR. SOBOL: Objection.

A. I did not do an analysis that looked at the demographics of the addicted population prior to 2010 and compare that with the demographics of death after 2010.

BY MR. KNAPP:

Q. You would agree that some percentage of people that overdosed on illicit opioids after 2010 started on opioids after 2010?

A. I don't have any data, but I would be surprised if that were not the case.

Q. And do you know what percentage of overdoses that represents?

MR. SOBOL: Objection.

A. No, I have not seen any data on people with overdose deaths when they started using overdose -- excuse me -- when they started using

opioids with the deaths at different points in time. I haven't seen anything on that.

BY MR. KNAPP:

Q. And you would agree that some percentage of people that overdosed on illicit opioids after 2010 first became addicted to an illicit opioid, not a prescription opioid?

MR. SOBOL: Objection.

A. I don't know for a fact whether that's true or not. I don't -- I -- if you ask me as a statistical matter would there likely be people like that, I would absolutely say yes.

Just to reference our earlier discussion, the heroin markets and fentanyl markets became what economists call thick markets in part because of the opioid epidemic, so even individuals who never took a licit opioid but who started on illicit opioids may very well have been affected by the actions of the defendants that created such a large market for illicit opioids.

BY MR. KNAPP:

Q. And I just want to clarify here. You said -- at least the transcript says so, even

individuals who never took a licit opioid but who started on illicit opioids may very well have been affected by the actions of the defendant. It's individuals who never took a licit opioid, you're saying that they're still impacted by the actions of these defendants?

MR. SOBOL: Objection.

A. That is correct, that's what I'm saying.

BY MR. KNAPP:

Q. And did you do any analysis of whether anyone reflected in the mortality data that you analyzed had actually received a prescription from a doctor for a prescription opioid?

A. No, I haven't done any analysis of whether people in the death records had any prescriptions, and I don't know of any literature that has done so.

Q. And so you can't say that any of the mortality that you attribute to -- strike that.

You can't say whether any of the increase in mortality that you attribute to defendants resulted from individuals who actually got a prescription for one of the

opioids that was manufactured or distributed by any defendant?

MR. SOBOL: Objection.

A. Two comments. One is I can't say that for sure. But second is I also don't think that's entirely relevant to the point that's being made here.

The point that's being made is that even if the individual did not start on licit opioids, that individual's access to illicit opioids is due at least in some part to the misconduct of the defendants in terms of having such a high level of shipments of opioids.

BY MR. KNAPP:

Q. And so defendants are indirectly responsible for that, in your view, because they're responsible for creating the environment for criminals?

MR. SOBOL: Objection.

A. They're responsible for creating an environment in which people are addicted. Those people who are addicted, some of them naturally turn to illegal substances because it's cheaper. Some turn to illegal substances as it gets more

expensive and more difficult to obtain legal substances.

And so -- and that movement of people, that movement of people into illegal markets makes those markets be thicker in an economic sense, more readily available, and therefore much lower cost -- by cost I mean monetary, time, potential consequences and so on -- much lower cost for people who start off even in the illegal market.

BY MR. KNAPP:

Q. Did you do any data analysis of the thickness of markets for illegal opioids in Summit or Cuyahoga County?

A. There are reports that were -- so did I -- there's not a single measure of how thick the market is that one can produce an estimate for. There are a number of reports that were done that I believe are in the estimates from the -- from the -- I'm trying to remember whether they're from the police or from the sheriff's, I can't remember who, that document over time what people are saying about ability to get opioids, and those do show increased

ability to get illegal opioids.

Q. Professor Cutler, did you personally do any analysis of the thickness of the market for illicit opioids in Summit or Cuyahoga County at any time period that you analyzed?

MR. SOBOL: Objection. Asked and answered.

A. Unfortunately -- going back to our earlier discussion, unfortunately we don't have data on the total use of illegal opioids anywhere, whether it's in Summit or Cuyahoga or any other county. So if one wanted to look at use of those substances, one simply does not have the data to do so, so I could not do an economic analysis of the use of illegal substances in those markets. What I know are the death rates that come from that.

There are also data, of course, from NSDUH on the share of people who have substance use disorder, and they also show an increase across the country and in Ohio in substance use disorder associated with illegal opioids.

BY MR. KNAPP:

Q. And to be clear, none of the papers

that you looked at talk about the thickness or the relative thickness of the market for illegal opioids in Summit or Cuyahoga County, right?

A. Unfortunately, no one has data on the total extent of heroin or fentanyl in those markets.

Q. So we've talked about what --

MR. SOBOL: I don't want to interrupt you. Why don't we do one more like piece, okay? But we need to call it quits. I think the witness is fading, even though he's hanging in there.

MR. KNAPP: That's fair.

THE WITNESS: Are you saying the witness is a whimp?

MR. SOBOL: Yes, the witness is a whimp. I mean, obviously it's up to you. Right. If you want to do another piece, that's great. I'm not trying to cut you off in a piece either, so you decide.

MR. KNAPP: Yeah, yeah. I appreciate it. Yep. I appreciate that.

BY MR. KNAPP:

Q. So we've talked about two of the

factors that you attribute to the increase in illicit opioid deaths after 2010. We've talked about decline in shipments and the restrictive policies that you've talked about.

Were there any other factors that you considered that contributed to the increase in deaths from illicit opioids after 2010?

A. I'm sorry, can you just give the two factors that you mentioned again?

Q. Decline in shipments, restrictive policies broadly defined.

A. Of course the restrictive policies were partly responsible for the decline in shipments, so it's -- the primary thing that we observed after 2010 was a reduction in shipments of legal opioids and a shift into illegal opioids, and that was caused by a number of different policies, including those we've spoken about.

Q. Were increase in traffickers from Mexico a contributing factor to the increase in deaths from illegal opioids after 2010?

MR. SOBOL: Objection.

You may answer.

A. I don't model specific factors in the report is one answer, so I don't have a quantitative basis to give you an answer to that.

The second answer I would give is also that as we discussed, the extent of the illegal market responds directly to people who are addicted and their need for continued substance use. So I don't think of that as an independent factor that would explain the mortality associated with illegal opioids so much as I think of that as a result of the conditions that had been created beforehand.

BY MR. KNAPP:

Q. What about reduction in the social stigma of using heroin, did that contribute to the increase in deaths from illegal opioids after 2010?

MR. SOBOL: Objection.

You may answer.

A. Again, I don't have any quantitative data on that, so I don't -- I cannot say anything quantitative.

I also believe that to the extent

there was a reduction in stigma associated with using heroin, that may very well have been a result of the increased use associated with the fact that so many people were addicted to opioids and, therefore, needed a place to go.

BY MR. KNAPP:

Q. What about the change in the purity of heroin that was available, did that contribute to the increase in opioid deaths after 2010?

MR. SOBOL: Objection.

You can answer.

A. I have no data on the impact of the change in the potency of heroin, so I can't say anything specific about it.

I also think that changes in potency are likely driven by the increased demand for heroin associated with people who were addicted to legal opioids making a transition from legal to illegal opioids.

BY MR. KNAPP:

Q. What about the introduction of illicit fentanyl, did that contribute to the increase in illicit mortality after 2010?

A. I don't have any data on the exact

introduction. It is, of course, true in the mortality data that use of fentanyl -- deaths associated with fentanyl increased enormously particularly after 2013, and certainly there are anecdotal reports of more fentanyl availability after 2013.

I again think that this is a result of individuals who were addicted to legal opioids finding it difficult to get those, creating thicker markets for illegal opioids, and then those illegal opioid markets becoming deeper, more -- that is the supply conditions in the illegal markets evolving to meet people's needs for the addictive product.

MR. KNAPP: Let's pick up here tomorrow.

MR. KO: How much time do we have on the record?

THE VIDEOGRAPHER: The time is 6:30 p.m., and we're off the record.

(Whereupon, the deposition was adjourned.)

COMMONWEALTH OF MASSACHUSETTS)

SUFFOLK, SS.)

I, MAUREEN O'CONNOR POLLARD, RMR, CLR, and Notary Public in and for the Commonwealth of Massachusetts, do certify that on the 26th day of April, 2019, at 9:00 o'clock, the person above-named was duly sworn to testify to the truth of their knowledge, and examined, and such examination reduced to typewriting under my direction, and is a true record of the testimony given by the witness. I further certify that I am neither attorney, related or employed by any of the parties to this action, and that I am not a relative or employee of any attorney employed by the parties hereto, or financially interested in the action.

In witness whereof, I have hereunto set my hand this 29th day of April, 2019.

Maureen O Pollard

MAUREEN O'CONNOR POLLARD, NOTARY PUBLIC

Realtime Systems Administrator

CSR #149108

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ACKNOWLEDGMENT OF DEPONENT

I, _____, do Hereby certify that I have read the foregoing pages, and that the same is a correct transcription of the answers given by me to the questions therein propounded, except for the corrections or changes in form or substance, if any, noted in the attached Errata Sheet.

_____

DAVID CUTLER, Ph.D. DATE

Subscribed and sworn
To before me this
_____ day of _____, 20____.
My commission expires: _____

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Notary Public

LAWYER'S NOTES

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